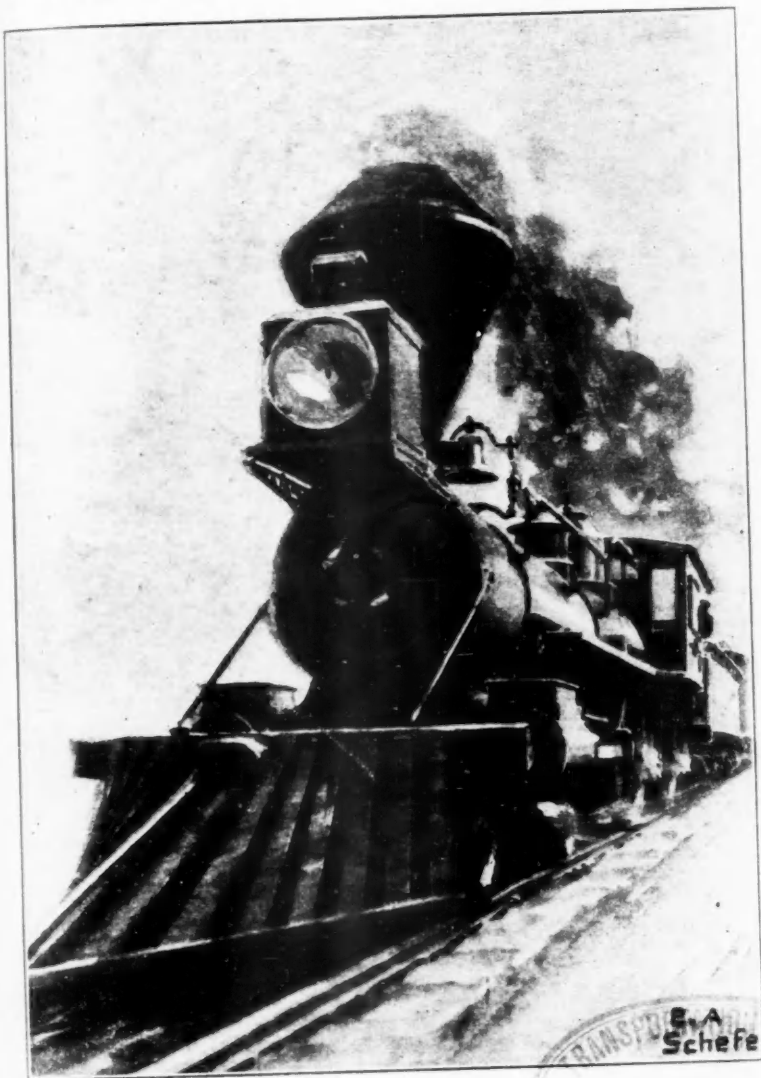
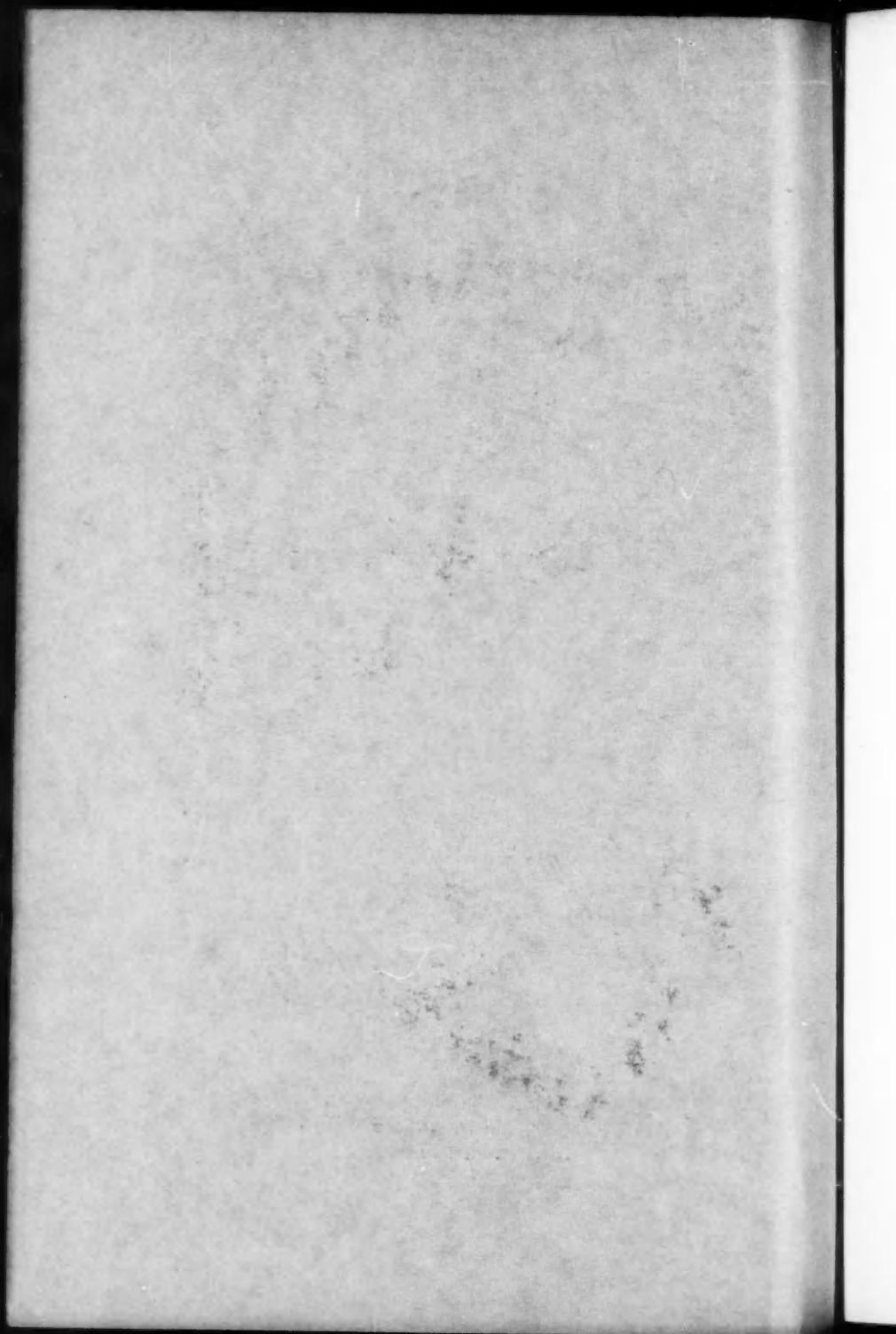


# BULLETIN No. 17



THE RAILWAY AND LOCOMOTIVE  
HISTORICAL SOCIETY



# BULLETIN No. 17

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In presenting this bulletin to our members your attention is called to the list of dates compiled by Warren Jacobs, a Director of this Society. It must be understood at the outset that this list covers only some of the principal events of the one hundred years of the railroad in New England. Some, doubtless of importance to you, are not mentioned, but the work as a whole represents years of search by the author. This list should prove invaluable to our members for the establishing of historical events and it is with deep appreciation to Mr. Jacobs for his many years of work, that it is reproduced here for your benefit.

In Bulletin No. 16 we reproduced a list of locomotives of the New York & Erie R. R. 1856, and in connection with his work on C. C. C. & I. R. R., Mr. Schmid listed their locomotives prior to 1882. These lists should prove invaluable to our members who are interested particularly in locomotives. By means of these lists your prints can be identified as a locomotive print with no data has little or no value. As rapidly as possible these

lists will be reproduced in our bulletin. Your editor has gathered from various sources over one hundred of these lists and in our next bulletin details of these lists will be given and copies will be furnished for those who wish them. In this connection many of us realize that it is a pleasure to exchange photographs with some of our members on account of the detailed information that is placed on the reverse side of each photograph and a disappointment with some who habitually overlook this matter of information which is surely of interest if the print is worth an exchange.

Of the additional material that appears in this bulletin, we are presenting the second of Mr. Young's articles on the Historical Notes of Locomotive Design which brings the locomotive past 1900. Mr. Mauldin has contributed a very interesting sketch of the South Carolina Canal and Railroad and his list of locomotives attached is indeed of value. While this country did not make but very little use of the steam tram, Mr. Bishop and his co-workers have presented an interesting sketch of a little known development in his country.

Our members will be interested to learn that during the summer there was a steady influx of material for our rooms at the Baker Library. At present writing there are four hundred framed pictures on the walls of two rooms and it presents as interesting a history of the development of our locomotive and railways that will be found anywhere in this country. It is hoped that during the coming months our members will avail themselves of the opportunity to visit these rooms as they are well worth a visit. The Room Committee deserve much praise and commendation for their efforts. Much is yet to be done by cataloguing this material and as rapidly as possible this information will be placed in the hands of our members. Meantime, those of us who have any material that they wish placed in our room or know the location of such material and can get it for the Society are urged to send it in. Credit is always given the donor and in placing it in the Baker Library you are safeguarding the material and placing where others will share in its value.

CHARLES E. FISHER.

## Steam Tramways in the British Isles

By G. W. BISHOP.

It is not always easy to distinguish between "railways" and "tramways." The earliest railways took the form of "tram-roads", and the two forms have since tended to become confused. For the purpose of these notes, two classes of "tramway" may be considered: (1) Lines bearing the title of "tramway," but more resembling light railways; (2) lines of the "street tramway" type, with the rails laid level with the surface of the street in cities or towns.

Tramways of the first class have been so often described in magazines and books that detailed allusion to them is scarcely necessary here. A few interesting specimens may be briefly mentioned, namely, the Wantage line, the first steam tramway opened in the British Isles (1875) and now closed for passenger traffic; the Glyn Valley Tramway, which uses a Baldwin engine; the Snowdon Mountain Tramroad, the only rack line in Britain; and the Wolverton and Stony Stratford Tramway, afterwards acquired by the London and North Western Railway.

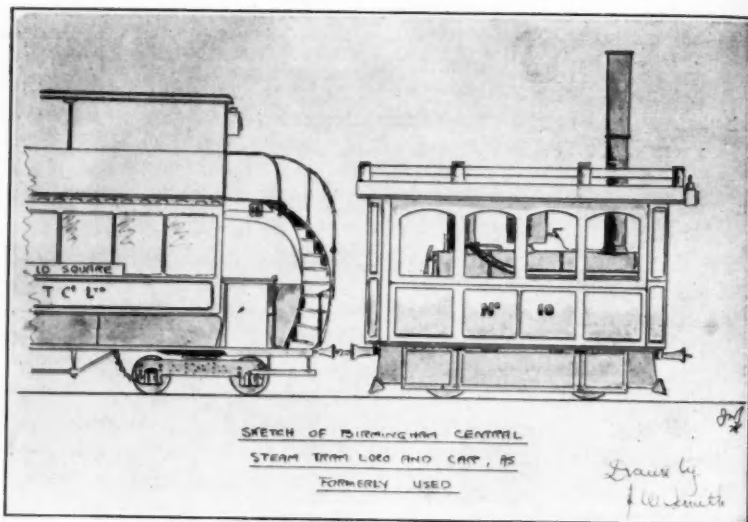
Information regarding the second class of tramways is not easy to obtain, and the subject seems a neglected one. Yet at one time many towns and cities possessed steam lines running through the streets, and the total number of companies must have been large. A volume of steam tramway history giving a complete list of the lines, would be a welcome publication, but at present I do not know of such a book being obtainable.

My own experiences of steam tramways were concerned with those in or around Birmingham and the Midlands. There were said to have been seven companies, with over 200 engines, in the Birmingham district, including the City of Birmingham Tram Co., the Birmingham Central Tram Co., and the Birmingham and Midland Co. The last named connected at Dudley with the Dudley and Stourbridge, and South Staffordshire Companies.

These lines used engines of the traditional 0-4-0 tank type, with the wheels and working parts completely cased in, to conform with the regulations for working through the streets. They mostly had fairly tall chimneys projecting above the casing, but one line at Birmingham had shorter copper-topped chimneys

that looked very smart. On some lines, including those at Coventry, Wilkinson's patent engines were used, which had vertical boilers and cylinders, and an arrangement for superheating the exhaust steam, so that it became invisible when discharged.

Tram engines were built by various engineering firms, including Beyer, Peacock & Co., Ltd., Gorton Foundry, Manchester; Thomas Green & Son, Smithfield Ironworks, Leeds; Falcon Engine Co., Loughborough; Kitson & Co., Airedale Foundry,



Sketch of Birmingham Central Steam Tram Loco and Car, as Formerly Used.  
Drawn by J. W. Smith.

Leeds; Manning, Wardle & Co., Boyne Engine Works, Leeds; Wilkinson & Co., Holmeshouse Foundry, Wigan.

All the above-mentioned lines in the Midlands have been altered to electric working, and the engines disappeared some time ago. This has been the case with many other steam lines, and now the electric cars, in their turn, are being supplanted by motor omnibuses.

The following notes upon Scottish and Irish lines, with the accompanying sketch of a characteristic engine and car, are by Mr. J. W. Smith, of Glasgow.

## Notes on Steam Trams in Scotland and Ireland.

By J. W. SMITH.

Mr. G. W. Bishop has been good enough to wish me to add to his notes on steam tramways, in so far as Scotland and Ireland are involved. It is a most pleasant task, and could be enlarged to considerable extent. Space will, however, militate against this, so that a few brief notes must suffice.

Taking Scotland first, there never was the same development as in the Midlands of England, although in all fairness the industrial development was less advanced, and in consequence called for simpler transport arrangements.

There were steam trams working in Dundee, of which the writer has no information, save that the locomotives were by Thomas Green & Son, a firm now extinct, and that they had roof condensers of two distinct types.

In Glasgow, or rather Govan, a burgh on the south side of the River Clyde, and not amalgamated to Glasgow till 1906 for municipal purposes, there was the Vale of Clyde Tramway. It ran from Paisley Road Toll to Govan Cross, about 3 miles. My information is that the gauge was  $4'7\frac{3}{4}"$ , a most strange size, and that there were 10 locomotives at work. It would appear that the Company had two batches, replacing the former by the latter as time progressed, namely:

1876 —No. 1.

1877 —Nos. 2-6.

1878-9—Nos. 7-10—10 engines.

These were on Hughes' patent, and all constructed by the Falcon Engine Co., at Loughborough, now the Brush Electrical Engineering Co. The later locomotives were:

1881—Nos. 1-8.

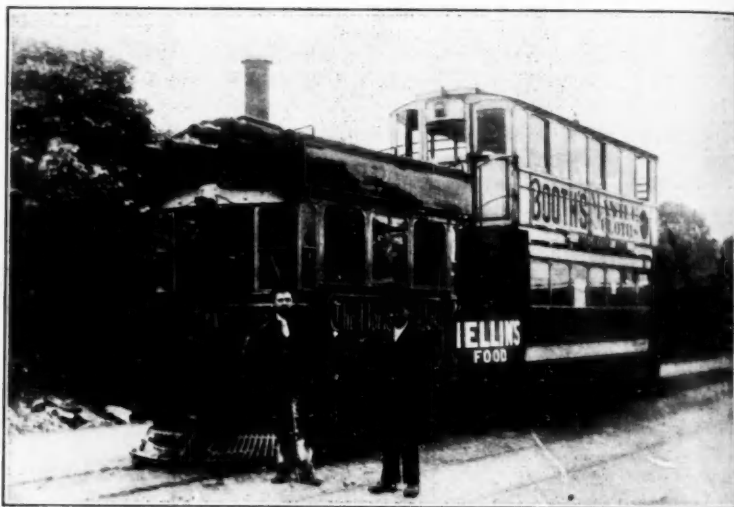
1883—No. 9.

1891—No. 10—10 engines.

All built by Kitson & Co., Leeds. No. 10 would appear to have been transferred from a small Irish line, the Cavehill and Whitewell, Belfast. At the same time No. 10 must have had the gauge altered to suit the Govan Road line.

A photograph to hand shows the stock used, and seated upon the cars' longitudinal top seat are several Scottish worthies with Glengarry bonnets, evidently bound for the Elder ship-building yards, now the Fairfield Engineering & Shipbuilding Co.

In 1896 the Glasgow Corporation took over all the City Tramways, and commenced to electrify the system and replace horse traction. The first electric section was in West Nile Street, about 1900, at the time of the Exhibition then being held in Glasgow. The system spread rapidly and eventually replaced



Bradford and Shelf Tram Co., Engine No. 11, Built by Thomas Green & Son, Leeds, 1888. Cylinders 9x14, Burrell Condensers. Car Built by Lancaster Wagon Co. Probably the only line in England using the vacuum brake.

the old Govan Road tram and its steam locomotives and stock. The gauge also was altered, and is now like the railways, 4' 8½". The present service along Govan Road is one of 2 or 3 minutes, and travels as far through the City to Airdrie in the east and Paisley and Elderslie in the west. While these changes are needful, one cannot help deploring the passing of the old stage-coaches. They were such interesting things.

In Ireland, the home of light railways of narrow gauge, the only line outside of Belfast that approaches the "tramway" idea was the Portstewart system,  $1\frac{1}{2}$  miles in length. This connected the little town of Portstewart with the main line railway between Belfast and Portrush. At first a private company, it passed into the hands of the Belfast & Northern Counties Ry., and again to the Midland Ry. (Northern Counties Committee), when that system took over the line. For a short period before its closing it became L. M. S. property and was shut down in 1926.

The traffic is now being worked by buses, and tickets are available "through," right to Portstewart town from the railway station. The line had a gauge of 3 ft., and there were at work 3 locomotives built by Kitson & Co., Leeds. They were numbered 1, 2, and 3, and were constructed in 1882, 1883 and 1901 respectively. No. 3 had the distinction of being the last tram engine built at Messrs. Kitson's works. It was No. 302 in their books.

There was a popular rumor that the Govan Tramway locomotives found a last home on the Irish line; but, from enquiries made from reliable sources, this is by no means the case. Indeed, the transferring of the No. 10 locomotive from the Belfast line before-mentioned to the Govan Tramway would seem a complete reversal of the suggestion.

The writer was glad to be able to take a trip over the Portstewart Tramway in the summer of 1925, and, while holidaying there, to watch its daily progress to and from the railway station. The stock usually made up was one double deck car, 1st. Class inside, 3rd. on top, and a trailer with open sides for the 2nd. Class passengers. There was also a baggage car. In Portstewart town there was a small station on the promenade, with booking office complete, and a small locomotive shed behind.

The march of time has spoilt this old world means of transport, and today the motor bus noisily rattles away the traveller, in contrast to the slower and more sedate progress of the steam tramway. There was one other line in this same district that is worth a note, namely, the Giants' Causeway Tramway. This was the first electric tramway in the world, at the time of opening (1883). To work the traffic in the height of the season, two steam tram locomotives were also employed, as, owing to power being supplied by hydro-electric means, the water supply was

not always sufficient to give the necessary "peak load" when wanted. This line is also closed down, the same cause working for its extinction, namely, motor competition.

In spite of these modern improvements, however, one is glad to be able to say something of a former age of travel, and to have had some slight association with them. Their memory will not quickly fade, either, through being preserved by the foresight of a Society established for that purpose.

### **Additional Note.**

By G. W. BISHOP.

By the courtesy of Mr. F. D. Ratcliffe, of Birmingham, we are enabled to add the following list of tramways, worked wholly or partly by steam, in the British Isles. All are company systems except where otherwise indicated. Mr. Ratcliffe has a large collection of tramway photographs, and has provided one to accompany these notes.

Accrington.  
Alford and Sutton.  
Barrow-in-Furness.  
Birmingham and Aston.  
Birmingham and Midland.  
Birmingham Central (taken over 1896 by City of Birmingham Tram Co.)  
Blackburn.  
Blackburn and Over Darwen.  
Bradford and Shelf.  
Bradford Tramways and Omnibuses.  
Brighton and Shoreham.  
Burnley and District.  
Castleberg and Victoria Bridge.  
Cavehill and Whitewell.  
Coventry and District.  
Dewsbury, Batley and Birstal.  
Dublin and Blessington.  
Dublin and Lucan.  
Dudley and Stourbridge.  
Dudley, Sedgeley and Wolverhampton (taken over by Midland Tramways, and later by Dudley and Wolverhampton Tramways, Ltd.).  
Dundee and District.  
Drypool and Marfleet.  
Edinburgh.  
Gateshead and District.  
Giants' Causeway and Portrush.  
Hartlepool.  
Huddersfield Corporation.  
Leeds (taken over later by Corporation).  
Manchester, Bury, Rochdale and Oldham (taken over 1899 by Bury, Rochdale and Oldham, and on termination of leases some steam stock was used by Oldham and Heywood Corporations for a time).

North London.  
North Shields and Tynemouth.  
North Staffordshire.  
Nottingham and District.  
Plymouth.  
Portstewart.  
Rossendale Valley.  
South Staffordshire.  
St. Helens and District.  
Stockton and District.  
Swansea Improvements and Tramways.  
Vale of Clyde.  
Wantage.  
Wigan.  
Wolverton and Stony Stratford.

Also, Rawtenstall Corporation has 2 locomotives, and Haslingden 1, built by Thomas Green & Son, Leeds, taken over from local systems, and now used for snow ploughing.

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(Original, unpublished.)

## In Eighteen-Fifty-Two

I saw her faded picture in  
A Railroad meeting hall;  
An engine of the Fifties, with  
A smokestack six feet tall.  
Her wheels were red, and she was decked  
In gold and royal blue.  
And built by Rogers, so it said,  
In Eighteen-fifty-two.

The gothic windows in her cab  
Had little pains of glass;  
Her boiler had a gorgeous dome,  
And ribs and rails of brass;  
And on its side a plate that bore  
Her name, the "Daniel Drew"—  
A factor in the Erie line  
In Eighteen-fifty-two.

All praise to our illustrious,  
And may their statues stand.  
But here is one of all unpraised,  
That reared this mighty land.  
The engine with the funnel-stack,  
The kind that Webster knew,  
That crossed the water and the wild  
In Eighteen-fifty-two.

Montreal.

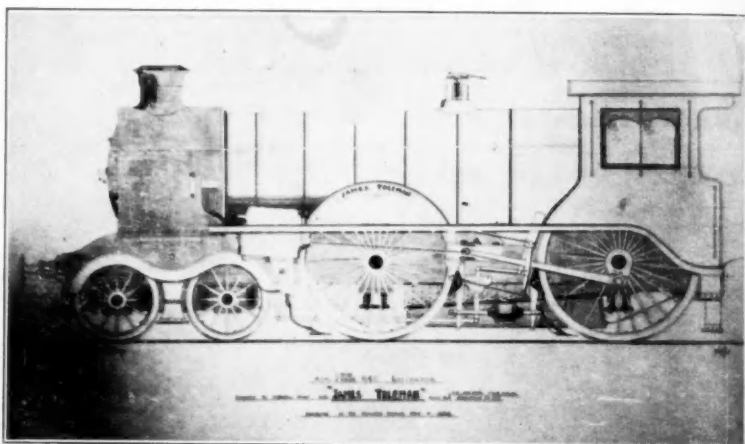
JOHN LOYE.

## F. C. Winby's "James Toleman"

By JOHN W. SMITH.

There was sent to the Chicago World Fair in 1893 a remarkable British locomotive bearing the name "James Toleman." This engine was to the design of F. C. Winby, and manufactured by the well-known engineering firm of R. & W. Hawthorn, Leslie & Co., Forth Banks Works, Newcastle-on-Tyne.

The idea was to construct a locomotive on recognized British lines, yet of exceptional power, and quite beyond the ruling designs of the period.

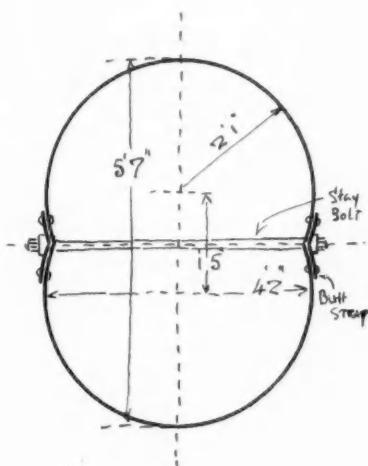


The "James Toleman"—Drawn by J. W. Smith.

Mr. Winby was a member of a well-known firm of consulting engineers, and had served his time in the Crewe shops of the L. & N. W. Ry. He would therefore come into contact and be acquainted with the notable F. W. Webb, of "compound" fame. This may have been a factor in his choice of 4 cylinders and uncoupled driving wheels, a method seriously open to objection as sound engineering, but was nevertheless then in vogue on the L. & N. W. as "Crewe" practice.

The final design that emerged was an uncoupled four-cylinder 4-2-2-0 type locomotive, having driving wheels 7' 6" in diam-

eter. The leading pair were driven by two inside cylinders 17"x 22", below the smokebox, and the trailing pair by two outside cylinders 16½"x24" located near the trailing bogie wheels. Stephenson link motion was employed for the control of the inside group, and Joy's gear for the outside, coupled to a common reversing lever for service purposes.



SECTION OF BOILER  
JAMES TOLEMAN  
Scale  $\frac{1}{2}$ " = 1 foot

The bogie had the small intercenter distance of only 5' 3". The wheels being 4 ft. in diameter. From the trailing bogie to the leading driver was 7' 0½", and the drivers were separated to the great extent of 11' 4½", the total wheelbase being 23' 8".

The locomotive weighed 60 tons in working order—a high figure for those days—and the distribution was as follows:

Bogie—25 tons.  
Leading Driver—18 tons.  
Trailing Driver—17 tons.  
Total—60 tons.

A large double-bogie tender was drawn down, but never actually constructed. It provided for 10 tons of coal and 7000 gallons of water, and was estimated to weigh, loaded, 65 tons.

The boiler was the most interesting, and the locomotive's weakest feature. It had a large heating surface in figures, though of less value in service. The large tube surface was provided at the expense of the firebox heating surface. Moreover, the large wheels (7' 6") made it necessary to pitch the boiler high, and to compromise matters, the design was altered from the circular to the semi-elliptical. Its center was 8' 2½" above the rails. The result was a boiler having an external vertical diameter of 5' 7" and a transverse diameter of 4' 2", with a longitudinal indentation on each side (see sketch) level with the center line, and caused by the re-entering angles of the two circles of which it was composed.

The barrel was 9' 2¼" long, and the firebox shell 8' 11½" long, while the firegrate had a length of 8' 3¾". In spite of the short barrel the tubes were no less than 14' 9¼" long, the front tube plate being recessed into the smokebox 12¾", and the back plate no less than 4 ft. The heating surface of the firebox, in spite of this, was 182 sq. ft., and the grate area 28 sq. ft. The total heating surface was 2000 sq. ft., with a working pressure of 175 lbs.

It need not be added the boiler was not steam tight in service, and gave a good deal of trouble.

The "Toleman" proved a failure in practice, on the Chicago, Milwaukee & St. Paul R. R., over which it was tried out, after the Exposition, and its end was probably the scrap heap at the Milwaukee shops.

Had the design been a little more regular, it is possible that much better results would have been secured, and the stigma of failure lifted from an otherwise cleverly thought out design.

The drawing shows the arrangement of this remarkable locomotive, the cantilever guide being specially notable and somewhat uncommon. A section of the boiler is also shown, so that its interesting construction may be readily appreciated.

# Dates of Some of the Principal Events in the History of 100 Years of the Railroad in New England.

1826-1926

Compiled by WARREN JACOBS.

## 1826

- Apr. 1—Construction commenced on Granite Railway.  
Oct. 7—Granite Railway opened. (First in America).

## 1827

## 1828

- Jan. 25—Message of Gov. Levi Lincoln advocating Rail-Road between Boston & Providence with horses as motive power.

## 1829

## 1830

- June 5—Boston and Lowell Railroad chartered.

## 1831

- June 22—Boston & Providence R. R. chartered.  
June 23—Boston & Worcester R. R. chartered.  
July 25—Boston & Worcester R. R. organized.

## 1832

- July —Construction commenced on Boston & Worcester.

## 1833

- Mar. 15—Wilmington & Andover R. R. organized.

## 1834

- Apr. 16—Boston & Worcester R. R. opened to Newton.  
June 4—Boston & Providence R. R. opened to Readville.  
July 3—Boston & Worcester R. R. opened to Needham.  
Sept. 12—Boston & Providence R. R. opened to Canton.  
Sept. 20—Boston & Worcester R. R. opened to Ashland.  
Nov. 15—Boston & Worcester R. R. opened to Westboro.

## 1835

- Feb. 5—Dedham Branch opened. (B. & P. R. R.).  
June 11—Boston & Providence opened to Providence.  
June 24—Boston & Lowell R. R. opened.  
July 4—Boston & Worcester R. R. opened to Worcester.  
July 28—Canton Viaduct completed.

## 1836

- May —Housatonic Railroad chartered.  
Aug. 8—Taunton Branch Railroad opened.  
Aug. 8—Wilmington & Andover R. R. opened.  
Nov. 7—Boston & Worcester Depot, Beach St. opened.

**1837**

- Apr. 5—Housatonic Railroad organized
- May 20—Survey and location of Housatonic commenced about 3 miles north of Bridgeport by R. B. Mason, Engr.
- Nov. 17—New York, Providence & Boston R. R. opened.

**1838**

- July 23—Stephen A. Chase appointed first Supt. of Eastern R. R.
- Aug. 10—West Stockbridge R. R. opened.
- Aug. 27—Eastern R. R. opened East Boston to Salem.
- Oct. 8—Nashua & Lowell R. R. opened.
- Dec. 3—Hartford & New Haven opened to Meriden.

**1839**

- Apr. 3—Andover & Haverhill changed to Boston & Portland R. R.
- Oct. 1—Western R. R. opened Worcester to Springfield.
- Dec. 17—Eastern R. R. opened Salem to Ipswich.

**1840**

- Jan. 1—Boston & Portland R. R. opened to Exeter.
- Feb. 11—Housatonic R. R. opened Bridgeport to New Milford.
- Mar. 9—Norwich & Worcester R. R. opened.
- June 17—Eastern R. R. opened to Newburyport.
- July 2—New Bedford & Taunton R. R. opened.
- Nov. 9—Eastern R. R. opened to Portsmouth, N. H.

**1841**

- Dec. 21—Western R. R. opened to Albany.

**1842**

- Jan. 1—Freight trains began running through Boston to Albany.
- Jan. 1—Boston & Portland changed to Boston & Maine R. R.
- Mar. 3—Fitchburg Railroad chartered.
- Sept. 12—Concord Railroad opened.
- Nov. 21—Portland, Saco & Portsmouth R. R. opened.
- Dec. 1—Berkshire R. R. opened Canaan to West Stockbridge.

**1843**

- Feb. 1—Boston & Maine opened to South Berwick Jct. Me.
- Dec. 7—Allens Point extension opened (Norwich & Worcester).

**1844**

- Mar. 16—Old Colony Railroad incorporated.
- June 10—New York & New Haven R. R. chartered.
- June 17—Fitchburg Railroad opened to Concord.
- Oct. 1—Fitchburg Railroad opened to Acton.
- Dec. 30—Fitchburg Railroad opened to Shirley.

**1845**

- Feb. 28—Connecticut River R. R. opened to Cabotville.
- Mar. 5—Fitchburg Railroad opened to Fitchburg.
- Apr. 7—Stoughton Branch opened
- June 9—Fall River R. R. opened Fall River to Myricks.
- July 4—Boston & Maine ceased to connect at Wilmington with Boston & Lowell. Use own tracks into Boston.
- July 21—Joseph H. Moore appointed first Supt. of Old Colony.

- Oct. 20—Haymarket Square Station, Boston, opened.  
 Nov. 10—Old Colony Railroad opened, Boston to Plymouth.

#### 1846

- Mar. 2—Old Colony trains use Boston & Worcester Depot.  
 Mar. 30—Deed from South Cove Co. to Old Colony Railroad for land for Old Colony Depot on Kneeland St.  
 July 6—Saxonville Branch opened.  
 July 30—York & Cumberland Railroad chartered.  
 Aug. 17—Connecticut River R. R. opened to South Deerfield.  
 Sept. 8—Chicopee Falls Branch opened.  
 Dec. 1—Pittsfield & North Adams Branch opened.  
 Dec. 3—Connecticut River R. R. opened to Greenfield.  
 Dec. 21—Fall River R. R. opened through to So. Braintree.

#### 1847

- Jan. 1—Peterboro & Shirley leased to Fitchburg Railroad.  
 Jan. 19—Essex Railroad (Salem and Danvers) opened.  
 Mar. 1—Medford Branch B. & M. opened.  
 May 19—Old Colony Depot, Kneeland Street, opened.  
 May 19—Fall River Line Boat Train First Trip.  
 May 19—Fall River Line, First Trip.  
 June 21—Bridgewater Branch (Old Colony) opened.  
 Aug. 3—Gloucester Branch opened to Gloucester.  
 Sept. 6—Milford Branch opened to Holliston.  
 Sept. 28—Providence & Worcester opened to Millville.  
 Oct. 25—Providence & Worcester opened to Worcester.  
 Nov. 29—Northern Railroad (New Hampshire) opened.  
 Dec. 1—Dorchester & Milton Branch (Old Colony) opened.

#### 1848

- Jan. 1—Amesbury Branch opened.  
 Jan. 19—Canal Road opened New Haven to Plainville.  
 Jan. 26—Cape Cod Branch R. R. opened to Wareham.  
 Jan. 31—Cape Cod Branch opened to Agawam.  
 Mar. 17—Agreement for use of Harlem tracks for New Haven trains, Wil-Hams Bridge to New York.  
 Apr. 10—Brookline Branch opened.  
 May 1—Boston & Providence line East Jct. to Central Falls opened.  
 May 22—Boston, Concord & Montreal opened to Sanbornton.  
 May 29—Cape Cod Railroad opened to Sandwich.  
 May —Cheshire Railroad (Fitchburg to Bellows Falls) opened.  
 July 5—Milford Branch opened to Milford.  
 July 6—Stony Brook Railroad opened.  
 Aug. 9—Fitchburg Railroad Depot, Causeway St. Boston, opened.  
 Aug. 10—Boston, Concord & Montreal opened to Meredith.  
 Oct. 2—Boston, Concord & Montreal opened to Lake Village.  
 Oct. 11—Conn. & Passumpsic opened to Bradford, Vt.  
 Nov. 6—Conn. & Passumpsic opened to Wells River.  
 Dec. 3—Boston, Concord & Montreal opened to Holderness.  
 Dec. 18—Worcester & Nashua R. R. opened.  
 Dec. 29—New York & New Haven R. R. opened.

#### 1849

- Jan. 1—South Shore Railroad opened (Braintree to Cohasset).  
 Jan. 1—Connecticut River R. R. opened to South Vernon.  
 Jan. 8—Sullivan Railroad opened. (Bellows Falls to Charlestown, N. H.).  
 Feb. 5—Sullivan Railroad opened to Windsor.  
 Apr. 15—Vermont & Massachusetts R. R. opened.

May 1—Norfolk County R. R. opened, Dedham to Walpole.  
 May 16—Norfolk County R. R. opened to Blackstone.  
 June 11—Naugatuck Railroad opened to Waterbury.  
 July 23—Naugatuck Railroad opened to Plymouth, Conn.  
 Sept. 24—Naugatuck Railroad opened to Winsted.  
 Sept. —New London, Willimantic & Palmer opened to Willimantic.  
 Nov. 13—Manchester & Lawrence Railroad opened.  
 Dec. 10—Concord & Portsmouth R. R. opened.  
 Dec. 31—Harvard Branch R. R. opened (Union Sq. to Harvard College).

#### 1850

Jan. 1—Housatonic Railroad opened to Pittsfield.  
 Jan. 1—Hartford, Providence & Fishkill opened Hartford to Bristol.  
 Feb. 11—Fitchburg & Worcester R. R. opened.  
 Mar. 27—Fastest run on Boston & Lowell, engine "Whistler", Engr. Isaac Hall, 12 cars, Lowell to Boston, 26 miles in 28 min.  
 Apr. 25—Canal Railroad opened to Granby.  
 Aug. 1—Salem & Lowell R. R. opened.  
 Sept. 2—South Reading Branch opened.  
 Sept. —New London Northern opened to Palmer.  
 Oct. 11—Jenny Lind Concert in Fitchburg Depot, Boston.  
 Nov. 4—Conn. & Passumpsic opened to Barnet, Vt.

#### 1851

Jan. 27—Ashuelot Branch opened.  
 June 10—Wilton Railroad opened.  
 Sept. 17—Railroad Jubilee in Boston.  
 Sept. 18—Railroad Jubilee in Boston.  
 Sept. 19—Railroad Jubilee in Boston.  
 Oct. 1—Famous locomotive races on Boston & Lowell.  
 Oct. 2—Famous locomotive races on Boston & Lowell.  
 Dec. —Watertown Branch opened to Waltham.  
 Work commenced on the Hoosac Tunnel this year.  
 Vermont Valley Railroad opened this year.

#### 1852

Feb. 22—Danbury & Norwalk R. R. opened.  
 July 6—New Haven & New London opened to Connecticut River.  
 July 22—New Haven & New London opened to New London.  
 Aug. 1—Troy & Bennington R. R. opened.  
 Nov. —Charles River Branch R. R. opened, Brookline to Upper Falls.

#### 1853

Jan. 20—Atlantic & St. Lawrence opened to Island Pond.  
 Feb. 1—Saugus Branch opened to Lynn Common.  
 Feb. —York & Cumberland R. R. opened to Saco River.  
 May 6—Norwalk disaster.  
 May 10—Boston, Concord & Montreal opened to Woodsville.  
 June 1—Charles River Branch opened to Needham.  
 Aug. —Boston, Concord & Montreal opened to Littleton.  
 Dec. 12—Name Norfolk County R. R. changed to Boston & New York Central.

#### 1854

Apr. 10—Eastern R. R. trains come in to Causeway St. Boston.  
 May 17—Old Colony changed from right to left-hand running.  
 June 20—Old Colony R. R. and Fall River R. R. consolidated.  
 July 8—Cape Cod R. R. opened from Sandwich to Hyannis.  
 Oct. 2—Fairhaven Branch R. R. opened.  
 Oct. 2—Hartford, Prov. & Fishkill opened Prov. to Willimantic.  
 Oct. 23—Newburyport Railroad opened.

#### 1855

- Jan. 1—Boston & N. Y. C. opened So. Dedham Jct. to Boston.  
Feb. 1—John Sever, Kingston, Mass. First Prest. Old Colony died.  
May 16—Easton Branch Railroad opened.  
June —Road Marlboro to Marlboro Jct. opened.  
July 1—Providence, Warren & Bristol opened.  
July 11—Hartford, Prov. & Fishkill opened Bristol to Waterbury.  
Dec. 1—Road Framingham to Northboro opened.

#### 1856

- July 4—Middleboro & Taunton Railroad opened.  
July 7—Canal Road opened to Northampton.

#### 1857

- July 15—New York & New Haven move up-town from 29 Canal St. to new station at 4th Ave. and 27th St.  
Nov. 4—Old Colony station Haskin's changed to Lakeville.  
First two coal burning engines on New York & New Haven furnished by Wm. Mason and Taunton Loco. Works in this year.

#### 1858

- Dec. 30—New London & Stonington Railroad opened.

#### 1859

- Dec. 12—First trip of the first through train between Boston and New York via Shore Line. Left Boston 11.10 A. M. due New York 7.30 P. M.  
Coal burning engines first used on the Fitchburg Railroad in this year.

#### 1860

#### 1861

- Mar. 28—Cape Cod Central organized to build road Yarmouth to Orleans connecting with Cape Cod R. R. at Yarmouth.  
Nov. 4—Gloucester Branch opened to Rockport.  
Nov. 8—New York & Boston R. R. opened Needham to Medway.

#### 1862

- June 21—Old Eastern Depot, Causeway St. Boston burned.  
Oct. 28—Maine Central formed by consolidation of the Androscogin & Kennebec and Portland & Kennebec.

#### 1863

- Aug. 5—Old Colony & Fall River changed to Old Colony & Newport.  
Aug. 10—Branch, Vernon to Rockville opened.  
Aug. 28—Hartford, Prov. & Fishkill deeded to B. H. & E. R. R.  
Nov. 26—Old Colony & Newport opened to Newport.

#### 1864

- Jan. —Branch, Berlin to New Britain opened.  
Aug. 17—William B. Stearns elected President, Fitchburg R. R.  
Dec. 1—N. Y. & Boston leased to Boston, Hartford & Erie.

#### 1865

- Oct. 4—York & Cumberland re-organized as Portland & Rochester.

# 1866

- Feb. 22—Hudson River Bridge at Albany opened.
- Mar. 19—Berdell Mortgage on Boston, Hartford & Erie.
- July —Road Northboro to Pratts Jct. opened.
- Sept. 4—Dutchess & Columbia R. R. organized.
- Sept. 24—Old Colony opened "New Road" Mayflower Park to Somerset Jct.
- Dec. 10—Charles Minot died at Somerville, former Supt. of B. & M. and originator of the train order by telegraph.

# 1867

- Feb. —Southbridge Branch opened.
- Apr. 13—Joshua Barney died at Detroit. Engineer who built the Andover & Wilmington. West Point, class of 1820.
- May 20—Name Agricultural Branch changed to Boston, Clinton & Fitchburg.
- June 13—Gridley Bryant died at Scituate. Built the Quincy Railroad. First in America.
- July 5—Nashua & Rochester R. R. chartered.
- Sept. 4—Boston & Worcester and the Western Railroad consolidated as the Boston & Albany Railroad.
- Dec. —Station South Quincy changed to Quincy Adams.

# 1868

- Feb. —Williamsburg extension opened.
- Apr. 21—Cape Cod Central sold to Cape Cod R. R.
- July 4—New Canaan Railroad opened.
- July 18—Hanover Branch R. R. opened.
- Aug. 1—Road Bellingham to Milford opened.
- Nov. 2—Crescent Avenue station opened (Old Colony).

# 1869

- Feb. 9—Norwich & Worcester leased to Boston, Hartford & Erie.
- May —Watertown Branch (Naugatuck R. R.) opened.
- June —South Manchester Railroad opened.
- July 1—Fitchburg & Worcester consolidated with B. C. & F.

# 1870

- Jan. —Suncook Valley Railroad opened.
- June —Ridgefield Branch opened.
- July 1—Massawippi Valley R. R. opened.
- Nov. 1—New York & New Haven leased Shore Line Ry. (NH to NL).
- Dec. 29—Cape Cod R. R. opened to Wellfleet.

# 1871

- June 19—Duxbury & Cohasset opened Cohasset to So. Scituate.
- June 30—Connecticut Valley opened to Saybrook.
- July 16—Portland & Rochester opened to Rochester.
- July 31—Duxbury & Cohasset opened to Marshfield.
- Aug. 5—New Haven & Derby R. R. opened.
- Aug. 21—Duxbury & Cohasset opened to Duxbury.
- Aug. 26—Revere disaster.
- Sept. 4—Boston, Barre & Gardner R. R. opened.
- Oct. 1—Lowell & Framingham Branch opened.
- Oct. 7—First Grand Central Depot New York opened.
- Oct. 9—Granite Branch first used for passenger trains.
- Dec. 21—Conn. Western opened Hartford to State Line.

### 1872

- Jan. 1—Shepaug Valley Railroad opened.
- Mar. 6—Old Colony station East Randolph changed to Holbrook.
- Apr. 12—Name Old Colony & Newport changed to Old Colony R. R.
- July 13—Woods Hole Branch opened.
- July 24—New York & New Haven and the Hartford & New Haven enter into an agreement to consolidate as the New York, New Haven & Hartford Railroad.
- July —Hawleyville Branch (Danbury & Norwalk) opened.
- Nov. 9—Boston, Hartford & Erie Depot, foot of Summer St. on site of South Station, burned in great Boston fire.
- Nov. 20—New Haven trains abandon the 27th St. station N. Y.
- Nov. 21—New Haven trains enter new Grand Central Depot.
- Dec. 2—Shawmut Branch opened.
- Dec. 24—Road Ashland to Milford opened.
- First engine built at New Haven shops in this year.

### 1873

- Jan. 9—West Amesbury Branch opened.
- Mar. 17—Boston & Maine open new line to Portland from No. Berwick via Old Orchard Beach.
- July 1—Nashua, Acton & Boston R. R. opened.
- July 23—Old Colony extension Wellfleet to Provincetown opened.
- Aug. 11—Providence & Springfield R. R. opened (Prov. to Pascoag).
- Aug. 15—Air Line opened, New Haven to Willimantic.
- Aug. 20—Old Colony station Littleton changed to Sea View.
- Nov. 24—Harlem River Branch opened.
- Nov. 27—Hoosac Tunnel completed.
- Dec. 3—Springfield & Northeastern R. R. opened (Athol Branch).
- Dec. 16—Ware River Railroad opened.

### 1874

- Jan. 1—Ashburnham Branch, Fitchburg R. R. opened.
- Jan. 1—Newport & Wickford R. R. opened.
- Jan. 1—Fitchburg R. R. leased Vt. & Mass. R. R.
- Jan. 1—Peterborough R. R. opened. (Wilton-Greenfield, N. H.).
- Jan. 5—Moshassuck Valley R. R. opened.
- Feb. 1—Dover & Portsmouth Branch opened.
- Apr. 8—Middleboro & Taunton R. R. deeded to Old Colony.
- May 7—Old Colony station No. Bridgewater changed to Brockton.
- June 21—Old Colony extension South Duxbury to Kingston opened.
- July 4—Wood River Branch Railroad opened.
- Aug. 1—Pawtuxet Valley Branch opened.
- Aug. 23—President U. S. Grant visits Provincetown by special train on Old Colony Railroad.
- Sept. —Eastern R. R. Northern Div. opened to No. Conway.
- Nov. 24—Nashua & Rochester R. R. opened.
- Dec. 26—Alvah Crocker first Prest. of Fitchburg Railroad and last surviving corporator died.

### 1875

- Jan. 4—Park Square Station, Boston, opened.
- Jan. 5—Park Square Station, Boston, dedicated.
- Feb. 9—First train through the Hoosac Tunnel.
- Apr. 14—Rhinebeck & Conn. R. R. opened to Boston Corners.
- May 24—Old Union Station, New Haven, opened.
- July 29—Boston, Revere Beach & Lynn R. R. opened.
- Aug. 15—Old Union Station, Worcester, opened.
- Oct. 11—Fall River Boat Train changed from 5.30 to 6.00 P. M.
- Dec. 16—Watuppa Branch opened.

### 1876

- Jan. 1—North Brookfield Branch opened.  
Jan. 1—Springfield & New London R. R. opened.  
May 8—"Washington Night Express," first trip, via N. Y. & N. E. Hartford and Harlem River (now the Federal Express).  
June 12—Granite Branch extended to Braintree.  
June 12—Woods Hole station changed to Woods Holl.  
July 17—Narragansett Pier R. R. opened.  
July 17—First regular trains through the Hoosac Tunnel.  
Oct. 1—Old Colony station South Scituate changed to Greenbush.  
Worcester Viaduct built in this year.

### 1877

- Jan. 8—Newburg, Dutchess & Conn. organized as successor to Dutchess & Columbia R. R.  
Feb. 12—At 4.00 P. M. the famous engineers strike on B. & M.  
Oct. —West Wrentham Branch opened.

### 1878

- Jan. 25—Tariffville bridge disaster.  
June 24—Old Colony station Hanson changed to South Hanson.  
Oct. 8—Wollaston disaster.

### 1879

- Feb. 1—Old Colony leased Boston, Clinton & Fitchburg R. R.  
July —Whitefield & Jefferson R. R. opened.  
Aug. 1—Old Colony station Cohasset Narrows changed to Buzzards Bay.

### 1880

- July 10—Nantasket Beach Railroad opened.  
Dec. 5—E. N. Winslow died at U. S. Hotel, Boston, was Supt. of Cape Cod R. R. many years.

### 1881

- July 13—Canal Road (NH&N) opened through to Shelburne Falls.  
July 24—N. Y. & N. H. opened from Waterbury to Danbury.  
Sept. 5—Boston & Albany Depot, Kneeland Street, opened.  
Oct. 1—Massachusetts Central R. R. opened.  
Oct. 6—Hanover Branch engine "Hanover" ran wild on main line. No harm done.  
Oct. 31—Turners Falls Branch opened.

### 1882

- Jan. —N. Y. & N. E. opened through to Fishkill-on-Hudson.  
June 19—Central Avenue station opened.  
July 4—Branch, South Norwalk to Wilsons Point opened.  
Sept. 10—Road Whittenton Mills to Raynham opened.  
Sept. 30—N. Y. N. H. & H. leases the Air Line (NH to Willi.).

### 1883

- Jan. 29—Bridgeton & Saco River R. R. opened.  
Feb. 17—B. & A. purchase N. Y. & N. E. line Brookline to Cook St.  
Mar. 1—Pemigewasset Valley R. R. opened.  
Aug. 1—Road Franklin to Bellingham Jct. opened.  
Oct. 15—Double track on Old Colony South Braintree to Campello.  
Nov. 19—10.00 A. M. New York Exp. Shore Line, First trip.  
Dec. 1—Worcester & Nashua and Nashua & Rochester consolidated as Worcester, Nashua & Rochester R. R.

#### 1884

- June 23—Dude Train, Boston and Woods Holl, first trip.  
June 23—Double-track extended Campello to Bridgewater.  
June 23—Monument, North Sandwich and West Sandwich changed to Bourne, Bournedale and Sagamore.  
Oct. 1—New Canaan R. R. leased to N. Y. N. H. & H.  
Oct. 11—Mellville station, Shawmut Br. discontinued, and new Shawmut station opened.  
Nov. 10—"New England Limited" first trip, Engine 45, Engineer E. E. Potter, Fireman W. H. Goodwin. Conductor Cushman, Willimantic 86 miles first stop.  
Dec. 2—Eastern Railroad leased to Boston & Maine.

#### 1885

- Jan. 15—Huntington Heights station changed to Montello.  
Feb. 2—Milton Lower Mills changed to Milton.  
Feb. 2—E. & W. Bridgewater changed to West Bridgewater.  
Apr. 1—Old Colony Branch Westdale to Elmwood opened.  
June 22—Nantasket station on South Shore changed to No. Cohasset.  
July 1—Boston, Barre & Gardner leased to Fitchburg R. R. Double-track extended Bridgewater to Middleboro.

#### 1886

- May 10—Station South Abington changed to Whitman.  
May 16—B. & A. opened Circuit, Newton Highlands to Riverside.  
Oct. 1—Danbury & Norwalk leased to Housatonic R. R.

#### 1887

- Jan. 1—Conn. & Passumpsic leased to Boston & Lowell.  
Feb. 1—Fitchburg Railroad leased Troy & Greenfield.  
Feb. 1—Fitchburg Railroad acquired Hoosac Tunnel.  
Feb. 1—Fitchburg Railroad leased Troy & Boston.  
Mar. 12—Charles P. Clark elected Prest. N. Y. N. H. & H. R. R.  
Mar. 14—Buzzeys Bridge disaster.  
Apr. 1—N. Y. N. H. & H. leased Naugatuck Railroad.  
Apr. 1—N. Y. N. H. & H. leased Conn. Valley R. R.  
Apr. 1—N. Y. N. H. & H. leased Canal Road (N. H. & N. R. R.).  
May —Name Shepaug Valley changed to Shepaug, Litchfield & Northern.  
June 1—Fitchburg leased Boston, Hoosac Tunnel & Western.  
June 6—Double-track between Braintree and East Weymouth. (OC).  
June 27—Boston & Lowell leased to Boston & Maine.  
June 27—First vestibule train run over Maine Central.  
June 30—Hanover Branch deeded to Old Colony.  
July 29—Springfield & New London deeded to New York & New England.  
Aug. 8—York Harbor & Beach R. R. opened.  
Oct. 1—Milford & Woonsocket leased to New York & New England.  
Nov. 21—Chatham Branch opened (Old Colony—Cape Cod Div.).

#### 1888

- Jan. 2—West Bridgewater Branch opened.  
Mar. 1—Old Colony station East Stoughton changed to Avon.  
June 24—B. & A. New York Exp. changed to leave at 4.00 P. M.  
June 25—"Gilt-Edge Express," Shore Line, First Trip.  
June 29—Meriden, Waterbury & Cromwell R. R. opened.  
Nov. 26—Road, Botsford to Huntington opened.  
Dec. —Poughkeepsie Bridge opened.

### 1889

- Jan. 1—S. M. Felton, first Supt. Fitchburg R. R. died at Phila.  
May 1—Providence & Worcester leased to N. Y. P. & B. R. R.  
July 10—New Haven & Derby leased to Housatonic Railroad.  
Aug. 17—Tilton & Belmont Branch opened.  
Sept. 19—Boston, Concord & Montreal and the Concord Railroad consolidated as the Concord & Montreal.  
Sept. 22—Interlocking at Forest Hills put in operation.  
Oct. 10—Thames River Bridge at New London opened.  
Oct. 24—Suncook Valley extended Pittsfield to Centre Barnstead.

### 1890

- Mar. 20—Plymouth & Middleboro R. R. chartered.  
May 12—Phila. Day Exp. First Trip—Shore Line and Penna. R. R.  
June 16—Fall River Boat Train transferred to Park Sq. station.  
Oct. 1—Fitchburg R. R. leased Cheshire Railroad.  
Oct. 1—Providence & Springfield leased to New York & New England.  
Oct. 13—Phila. Day Exp. extended to Washington.  
Oct. 13—Old Colony sta. East Marshfield changed to Marsh. Hills.  
Oct. 13—Old Colony sta. Sequasset changed to Eastondale.  
Oct. 13—Double-track East Weymouth to Old Colony House.  
Dec. 1—Road Walpole Jct. to No. Attleboro opened.

### 1891

- Jan. 4—"Washington Day Express" discontinued.  
Mar. 16—"White Train," New York & New England first trip. Engineer E. E. Potter, Conductor M. W. Crowley.  
Apr. 1—Road Woonsocket to Harrisville opened.  
June 15—Old Colony sta. Satucket changed to Westdale.  
Sept. —Long Island & Eastern States Line established.  
Oct. 12—Old Colony sta. Webster Place changed to Green Harbor.  
Nov. 22—Tower at Atlantic opened.  
Dec. 1—P. W. & B. R. R. leased to Old Colony.  
Dec. 4—The four trains at East Thompson.

### 1892

- Jan. 4—Second track completed Concord Jct. and No. Acton Jct.  
Jan. 5—Bristol Railroad opened.  
Jan. 18—Wash. Day Exp. restored as "Colonial Express."  
Jan. 27—James T. Furber, Gen. Manager Boston & Maine died.  
Feb. 15—Road Norwood to Walpole Junct. opened.  
Apr. 1—New York, Providence & Boston leased to New Haven.  
May 16—"Shore Line Flyer" First Trip. 5hr. 40min.  
June —Long Island & Eastern States Line discontinued.  
July 1—Housatonic Railroad leased to New Haven.  
Sept. 7—Fitchburg R. R. Milford Br. opened to Brookline, N. H.  
Oct. 16—Interlocking at B. & A.—Old Col. Dartmouth St. opened.  
Oct. 16—Interlocking at East Junction put in operation.  
Oct. 17—Strawberry Hill sta. changed to Waveland. (Old Colony).  
Dec. 5—Plymouth & Middleboro R. R. opened. (Old Colony).

### 1893

- Jan. 1—Boston & Maine leased Connecticut River R. R.  
Jan. 29—"Washington Night Express" (now "Federal Express") transferred from New York & New England Depot to the Park Square Station, Boston.  
Mar. 1—New Haven leased the Old Colony Railroad.  
June 11—N. Y. & N. E. line Pascoag to Douglas Jct. opened.  
June 26—"Bay State Limited" First Trip 5 hrs. to N. Y.  
Oct. —Plymouth Div. organized as successor to Central Div. O. C.  
Nov. 20—Eastern Div. Boston & Maine first use new North Station.

#### 1894

- Jan. 1—General Office Building at New Haven opened.  
June 17—New Train Rules on Old Colony System NYNH&HRR superceding Old Colony Rules of 1891. Old Colony Positive Meet on single-track adopted by N. H.  
Aug. 12—Fitchburg Railroad trains enter new North Station.  
Nov. 15—Fitchburg Railroad, Milford Branch opened to Milford.

#### 1895

- Jan. 1—Bangor & Aroostook R. R. opened.  
Jan. 25—Concord & Montreal leased to Boston & Maine.  
June 30—Nantasket Beach Branch electrified.  
Aug. 26—New England R. R. organized as successor to N. Y. & N. E.  
Sept. 1—New England R. R. assumed possession of N. Y. & N. E.  
Sept. 22—Old Colony System NYNH&H changed from left to right hand running. (see 1854).  
Oct. 20—Last trip of the "White Train."  
Oct. 21—First trip of "Air Line Limited" via Dedham.

#### 1896

- Aug. 22—New England Depot abandoned. Last train out 11.17 P. M. Franklin and way stations.  
Aug. 23—New England trains use Old Colony Depot, Kneeland St.  
Aug. 24—Asa R. Porter died. Famous Conductor Fall River Boat Train.  
Aug. 24—Elevation of tracks Prov. Div. to Forest Hills completed.  
Nov. 1—Stoughton Central changed to Stoughton.  
Nov. 1—Stoughton station changed to South Stoughton.  
Dec. —Work started on electrification Hartford-New Britain and New Britain-Berlin.

#### 1897

#### 1898

- July 1—New England R. R. consolidated with N. Y. N. H. & H.  
July 25—N. E. engine #155 came out of Norwood shop as #1055 N. Y. N. H. & H. First N. E. engine painted over.  
July —Shepaug, Litchfield & Northern leased to N. Y. N. H. & H.  
Sept. 18—New Union Station, Providence opened.  
Dec. 31—Old Colony Depot, Kneeland St. abandoned at midnight.

#### 1899

- Jan. 1—New South Station, Boston opened.  
May 15—Trinity Place station opened.  
June 4—Road Allyn's Point to Groton, Conn. opened.  
July 23—Boston & Albany trains enter new South Station.  
July 25—Electric trains between Braintree and Cohasset.  
Sept. 10—Providence Div. trains enter new South Station.  
Sept. 10—Back Bay Station opened.

#### 1900

- Jan. 1—Pullman Co. absorbed the Wagner Palace Car Company.  
Jan. 1—Portland & Rochester leased to Boston & Maine.  
July 1—Boston & Albany leased to New York Central.  
July 1—Fitchburg Railroad leased to Boston & Maine.

#### 1901

- Mar. 1—Charles P. Clark, Prest. NYNH&H died at Nice, France.  
June 9—Cape Cod Div. doubled up with Plymouth Division.

## 1902

May 19—"Knickerbocker Limited" first trip. Succeeds "Air Line Limited."

## 1903

June 27—Road No. Attleboro to Adamsdale, "Adamsdale Extension" opened.  
July 12—Old Main St. Sta. Danbury closed.  
July 13—New Station at Danbury (White St.) opened.  
July 19—Readville Car Shops opened.  
Aug. —Work commenced on new Grand Central Terminal.  
Nov. 1—Chas. S. Mellen became Prest. of NYNH&H.  
Dec. 14—"Merchants Limited," first Trip.

## 1904

Jan. 31—Old Station at Bridgeport closed.  
Jan. 31—Temporary station at Bridgeport opened.  
Jan. 31—First train over raised tracks at Bridgeport.  
Feb. 1—The New Haven leases the Central New England.  
May 1—Brass Baggage Checks discontinued, new paper checks.  
May 13—Four-tracking New Haven Cut authorized.  
May 29—Old 8.30 A. M. for Fishkill changed to run to Poughkeepsie.

## 1905

Jan. 1—Pequonnock station changed to Midway.  
Jan. 27—John M. Hall, Ex. Pres. NYNH&H died.  
Aug. 20—New Station at Bridgeport, Conn. opened.

## 1906

Apr. 25—"Mayflower Limited" First Trip.  
June 10—Trains putting up at So. Duxbury extended to Plymouth.  
June 10—9.00 A. M. N. Y. Exp. Springfield Line made 9.15.  
Nov. 4—West Roxbury-Needham Line opened.

## 1907

May 1—Maine Central leased Portland & Rumford Falls R. R.  
June —Electrification New York Div. to Stamford.  
July 2—Readville Locomotive Shop opened.  
Nov. 4—"Mayflower Limited" Last Trip.  
First "Grasshopper" engines on NYNH&H in this year.

## 1908

Feb. 1—NYNH&H re-divisioned, no more Plymouth Division.  
Mar. 29—Old Bank St. Depot Waterbury closed.  
Nov. 15—Providence Tunnel under College Hill opened.

## 1909

June 21—First shovelful of earth for Cape Cod Canal dug by August Belmont at Bourne-dale at 1.20 P. M.  
June 21—Boston & Maine adopts the "Standard Code" of rules.  
Oct. 3—"Twentieth Century Limited" first trip from Boston 1.00 P. M.  
Oct. 28—NYNH&H purchases the Newport & Wickford R. R.

#### 1910

Oct. 2—Work of electrification of Hoosac Tunnel begun.

#### 1911

May 31—Four-tracking the New Haven Cut completed.  
May —Electric engines first used in the Hoosac Tunnel.  
June 4—New Union Station, Worcester opened.  
July 31—Greenbush first used as terminal.

#### 1912

Apr. 21—New England Association of Railroad Veterans organized in the old Fitchburg Depot, Boston.  
Apr. 29—Act abolishing grade-crossings at Pawtucket approved.

#### 1913

Jan. 1—NYNH&H Parlor and Sleeping Cars taken over by Pullman Co.  
Feb. 1—The new Grand Central Terminal New York opened.  
Oct. 10—J. D. Tyter appointed Gen. Supt. Boston & Maine.

#### 1914

Jan. 14—Tower A. North Station burned.  
Feb. —Billerica Shops, Boston & Maine opened.  
Apr. 11—Grade-crossings elimination at Pawtucket completed.  
July 29—Cape Cod Canal opened.  
Dec. 20—First train over new location at Pawtucket-Central Falls.

#### 1915

Jan. 8—Station South Framingham changed to Framingham.  
June 27—Name New York Central & Hudson River changed to New York Central.

#### 1916

Jan. 16—New Station at Pawtucket-Central Falls opened.  
Oct. 2—Last Trip of the "Dude Train" (see 1884).

#### 1917

Apr. 1—Hell Gate Bridge opened, "Federal Express" First regular train to cross.  
Apr. 17—Ground broken for new depot at New Haven.  
Apr. 30—"Colonial Express," first trip over Hell Gate Bridge.  
June 11—"Washington-Bar Harbor Ex." first trip over Hell Gate Bridge.  
Nov. 25—First Pittsburg train via Hell Gate Bridge.

#### 1918

Jan. 5—Last Trip of the "Bay State Limited."  
Apr. 2—Work commenced on tearing down Old Colony Depot.  
May 9—Old Union Station at New Haven burned.

#### 1919

#### 1920

Mar. 1—United States Railroad Administration ends.  
Mar. 28—"The Quaker" Phila. Exp. First Trip.  
Apr. 5—New Depot at New Haven opened.  
July 19—L. C. L. Transfer at Cedar Hill put in use.  
Dec. 13—First through sleeper Boston & Florida via Hell Gate Bridge.

## 1921

Jan. 17—Westbound side Cedar Hill Yard opened.  
Mar. —Northup Ave. Hump opened. (Providence).  
July 20-21-22-23-30—Pilgrim Pageant at Plymouth.  
Aug. 1-2-3-10-11-12-13—Pilgrim Pageant at Plymouth.

## 1922

June 10—"Fall River Boat Train" New Steel Cars. "Fall River Line" on body of car Comp. 6007 coaches 8082-8083-8084-8090, Engine 807, Pullman "Dighton" on first trip also.  
Dec. 18—Last trip of Engineer E. E. Potter, famous engineer of the "Ghost Train" retires 50 yrs. perfect record.

## 1923

Jan. 1—Through sleeper to St. Petersburg on "Colonial Express."  
June 11—Broad St. Phila. Sta. burned.  
Nov. 11—"Everglades Limited," first trip.

## 1924

June 15—"Washington-Montreal Express," first trip.  
June 15—Dudley St. Sta. changed to Uphams Corner.  
Sept. 28—"Merchants Limited" scheduled to run on Sundays.  
Oct. 24—Ground broken electrification So. Norwalk to Danbury.  
Nov. 20—Castleton Bridge opened.

## 1925

Jan. —Seaside Sta. changed to Cordage.  
Jan. 17—The old Fitchburg Depot damaged by fire.  
Feb. 16—New steel suburban coaches on Boston & Albany.  
July 3—The "Cape Codder," first trip. First through train between New York and Cape Cod.  
Aug. 1—No. 1342 on "Cape Codder." First of I-2 class run on Cape.  
Sept. 28—"Pine Tree Limited" First trip from Track 13 North Station. Engine 3706 Comb. 3607 Parlor Cars "Sevena" and "Ferne" Dining-Car 1093, Steel coaches 4574-4557.  
Oct. 2—First through sleeper Boston & New Orleans on "Colonial Express."

## 1926

Apr. 25—9.15 A. M. New York Exp. Springfield Line to run Sundays.  
Apr. 25—"Flying Yankee" re-established on Boston & Maine.  
Apr. 25—First trip of the "Red Wing" Boston-Montreal.  
May 15—First trip of the "Minute-Man" Track 14 North Station 3.00 P. M. Engine 3667, Club Car "Applachia," Pullman Sleepers "McAlpin" and "Irving", Parlor-Car "Amaranth", Dining-Car 1092, steel coaches 4505-4014-4511.  
June 1—B. & M. line Wells River to Newport taken over by C. P. R.  
June 1—B. & M. line Newport to Sherbrooke taken over by Quebec Central.  
June 1—B. & M. Stanstead Branch taken over by Quebec Central.  
Sept. 4—Shawmut Branch discontinued Harrison Sq. to Shawmut Jct.  
Oct. 7—100th Anniversary of opening of the Granite Railway.  
Oct. 12—Celebration of 100th Anniversary at East Milton.  
Dec. 1—Work of lowering floor of Hoosac Tunnel completed.  
Dec. 19—New Union Station, Springfield completed.

Southbridge, Mass., February 19th, 1917.

Dear Mr. Fisher:

When your kind letter of the 16th came Saturday morning I thought before opening it that you had got after me for not replying to a previous and most interesting letter which has been due you more than a month. I will first answer this one of the 16th. I thank you for bringing or placing my old locomotive "Franklin" together with my letter to the notice of your friend in New York State. I hope he was interested and think "us 3" could compare notes most interestingly.

I have a blue print of the old locomotive "Pioneer" built by Timothy Hackworth at New Castle, England for the first railroad in Canada—the New Brunswick & Canada, antedating the Grand Trunk. It was called the St. Andrews & Quebec and was its first locomotive. She came by ship to St. Stephen then by barge up the St. Croix and Digadaguash rivers, then unloaded and hauled by oxen through the wilderness to Barber dam and there put in motion. The drawing which I have is a tracing sent along with the engine and held for many years by Sir Henry Osborn, who as Chief Engineer built the road and became President. He was sent over from England, a gallant young Civil Engineer from the Great Northern R. R. and in his evening of life, gave me the tracing. I had blue prints made at the works at McAdam Jet., 30 years ago, and gave quite a few of them away.

I have seen the old "Sampson" built by Hackworth. She was running in 1894 and was then about 60 years old. The boy who came with her was still running her. He was nearly 80 and a fine old Scotchman named Davidson.

I regret I cannot say who built the "Douglas" or what went with her. The Douglas Axe Co. bought her second hand and no doubt named her. She at last went through that high trestle across the Blackstone River and streets in Blackstone and that ended her days. The bridge had a gap in it many years but was finally rebuilt with wood and more than 40 years ago was replaced with those graceful stone arches now in use. Mr. William H. Ward for whom I rebuilt the "Franklin" built that bridge with Douglas granite. He built the Long Island R. R. and the New York & New England R. R. west of Putnam. Also the Lowell & Andover, the Hopkinton R. R. and the Southbridge branch, all the street arches in Lowell across the canals of the

Merrimac and his most lasting and crowning work was the building of the Bennington Battle Monument at Bennington, Vt., 308 feet high, 37 feet at the base, time 2 years, dedicated March, 1891, cost \$117,000.00 and built of Sandy Hill blue stone. I do not know that Mr. Ward is living. He could tell of the "Douglas", "Waterford" and "Walpole." His son-in-law converted the Hinkley Locomotive Works to the power station for



G. A. Haggerty.

the present Boston Elevated Ry. I am quite sure that the "Franklin" was changed to a link motion in the B. & P. shops. That 11 miles in 15 minutes was nothing for her though no doubt too fast for the "Nason." With her 5' 11" driving wheels and her 20" stroke she could do most anything. I fired her the first trip I ever fired from Woonsocket to Milford. We went off the track at Milford Jet. but did not turn over.

It may be that the "Waterford" and "Walpole" went to the War after the war broke out for until 1864 the road was surely dead. As I have written you, the road was built from Blackstone to Mechanicsville (near Putnam on Norwich & Worcester R. R.) then called the "Birch Factory" and Boat Trains were run from Boston to connect with the Norwich & Worcester trains at the Factory. It did not pay and was abandoned and grew up to trees.

The Norwich & Worcester was opened in 1839. I commenced to see their trains about 1860 and their engines were always clean and bright, striped and varnished. My Grand Uncle Frances Vintow built the road as Chief Engineer. I used to drive with my father to Webster when he went there on business to see the trains. Here are many of the names of the engines that drew the bright yellow passenger cars with flat tops: "Colonel DeWitte", "Norwich", "Rockwell", "J. C. Stockwell", "J. W. White", "Nathan Hale", "Shetucket", "Thames", "Uncas", "Pequot", "Mohegan", "Sachem", "Sagamore", "Nipmuck", "Waregan" and a few more, all burning wood and a few had negro firemen. Some had one pair of drivers and some had two; some were inside connected and some outside. They were Hinkley and Rogers engines, while the "Pequot" and "Mohegan" were built at Lawrence.

I think the "Hamilton Willis", "Edward Crane", "Welcome Farnum" and "Walpole" all disappeared at the same time. When the reconstruction began in 1864 the "Hookset" appeared with the "Pup" as her watchdog. In 1866 when the road was opened to Southbridge, the "Pup" had grown to full size and was used for a while on the passenger train Southbridge to Boston and return same day, 71 miles and 31 stops each way with three cars. She did the best she could but her wind was bad for her task. She was very small, had but one pair of driving wheels. I have seen her but don't know who built her. She went to the scrap soon after. I think we better conclude that the "Waterford" and perhaps the "Willis" and others rest among the National Heroes at Arlington Heights, Va.

Feb. 25th, Sunday.

Was making good progress on this letter the 19th but had to go away. Now for yours of January 8th which is still unanswered.

I was not at the Works (Mason) very much after 1871 and left for good in 1877. In 1873 I took engines to the Lehigh Valley, Atlantic, Mississippi & Ohio R. R. My last work for them was in Texas upon the Galveston, Harrisburg & San Antonio in 1876-77 and while there the road was completed to San Antonio.

I ran a race in 1878 with an old New York & Erie Taunton engine you mention. She was on a branch known as the Attica Branch and had a four car passenger train. I had an oil train on the Rochester & State Line and a Brooks 17x24" engine. The tracks were parallel, about 200 feet apart and level. I saw them coming miles away to the south and I put on all speed. She overtook me and went past like a gust of wind but I had a good look at her and knew her from the family resemblance.

Yes, the old "Hooksett" came from the Concord R. R. and the "Pup" came with her (for Boston, Hartford & Erie). I remember the old "Mattapoiset" very well indeed. She was inside connected and built at the Matfield Locomotive Works (in 1855 I think) at East Bridgewater, Mass. They failed with about 20 other locomotive companies and went out in the panic of 1857. The old "Matty", as she was called for short, had seen her best days. She ran here in 1866 as did some old "Dieky" Norris engines—the Nos. 8 and 9. We had some beautiful new passenger engines built by Hinkley Williams & Co. These were the "Deer" and the "Fawn". We had fine new Tauntons—No. 17, no name, the "Enterprise" No. 22 and the "Moose." There came three new McKay & Aldus engines built in East Boston in 1866, 16x24", Nos. 18, 19 and 20. B. W. Healey was their Sup't. and they were of Mason pattern to be sure. The 18 was a passenger engine and named "Pioneer." I rode all the way to Boston on her, by permission, when 13 years old with Engineer Lord.

I was in New Brunswick ten years, five with the New Brunswick Ry. and five with the Canadian Pacific, their successor. I took hold in 1885 just after those three Msons had been placed there. That Maine Central lettering was part of the game to beat the Canadian Customs laws. Before they reached the International boundary the Maine Central lettering was removed from the tenders and the names without numbers remained. When they arrived at the boundary they then had become the property of the New Brunswick Ry. which had three branches running into Maine and the branches were and had been for

years named as the three locomotives were. It was then that they sprung the game by asking the Government to enter them duty free, claiming that they had not been bought for the New Brunswick Ry. but for the branches in Maine and that the intention was to run them each day and return from Vanceboro, Maine across the line into Canada, then across the line to Houlton and return and to other points, viz. Aroostook and Caribou. The game worked very well. The Government consented but for five years watched the game and saw that it was carried out. There were some violations as many times they had to be run to St. Johns, but the game worked. I could see a financial gain but often a disadvantage. They were bought for \$5500.00 each and they saved 10% ad valorem or \$550.00 each. The New Brunswick Ry. was then owned in New York. When the Canadian Pacific took the property that was all removed. Those engines were built on honor and worth much more. I wore them out pretty well in freight service. I rebuilt one of them as a fast passenger engine, enlarged her drivers from 5' to 6' 2", gave her my paper box balanced valves, hardened the truck and tender wheel steel tires, turned part of the exhaust into the tender, attached my own appliance for burning smoke, strengthened the boiler to carry a higher pressure, made other changes but did not disturb a single Mason outline. She had 17x24" cylinders and whipped everything the C. P. had with 18x24" cylinders. She was taken to Montreal on trial, went as far as Toronto and examined and measured all over. I went with her to be sure she would move herself with 25 pounds of steam while it took 100 to move their bungling standards. She hauled President Van Horne 125 miles in 125 minutes with ease. She would run 10 miles more to the ton of coal than an 18x24" in the same service. It cost just \$5000.00 to rebuild her in that shape but she was worth \$10000.00. Some fault was found with the cost, to be sure, but all went very well.

I have seen the old "Providence", inside connected, 4 drivers, very handsome, built for the Providence & Worcester R. R. She had high drivers and a tender truck of eight wheels—all in one truck. The Providence & Worcester had one of his insiders with one pair of drivers and the eccentrics were plastered onto the hub of the driving wheel, one eccentric on each side. His inside engines, some of them, and perhaps his outside had the V-hook motion and then, right then came his Boardman boiler. It

ran way front and the main axle front ran through the firebox through a sleeve to protect it and the valve motion had to be outside. He was a great inventor and a bold experimenter. A pity he could not have lived longer to accomplish much he had just undertaken. I so much admired him.

I am sure the "Champlain" was built for the Rutland & Burlington R. R. She was a drop hook and a variable cut off, one valve lying on top of the other on each side—four valves—four eccentrics for the hooks with a return arm for the cut off. She had four levers besides the throttle and it took a man to handle her on a table or at a water tank. Those old engines could go with the speed of light. They were built before the invention of the steam gauge.

If you can read this and digest it in  $\frac{3}{4}$  of an hour you will do well.

Very truly yours,

GEO. A. HAGGERTY.

Southbridge, Mass., March 5th, 1917.

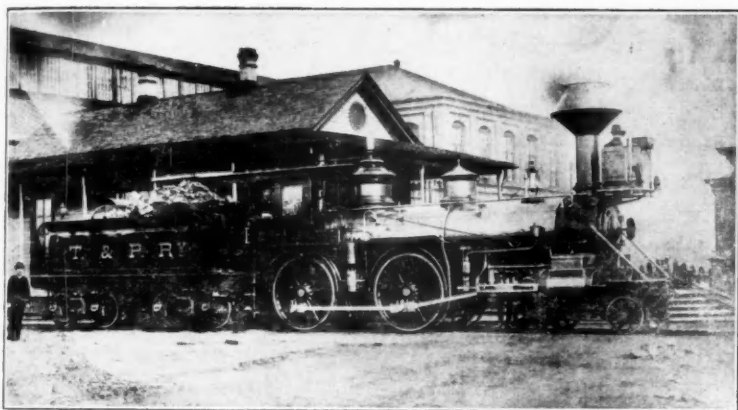
My dear Mr. Fisher:

Your letter of recent date came safely. I regret to learn of the death of Fred Shalling, yet did not think it possible he was living when I came home in November. Had I known it I would certainly have gone and seen him. He taught me how to grind a cold chisel and to use a monkey wrench while he was in charge of erecting the "Onward", the second Fairlie and the first Mason Fairlie as well as the first narrow gauge ever built by William Mason. She went to Salt Lake, no name of road as I know, and Fred went with her. She had 9x15" cylinders and 33" driving wheels. Her mate, or one like her same size driving wheels went to the North & South R. R. of Georgia. Both had a bell on top of the sand box—all brass, had link motion. She went through a trestle near Rome, into the Georgia mud, was exhumed, brought home, rebuilt and sold to the Boston, Revere Beach & Lynn R. R. She was a little bird but rode hard at high piston speed. I ran her many trips to Lynn and she could make 15 miles an hour with 6 cars of passengers. Her name there was "Orion."

I went there in October or November, 1875, soon as the "Franklin" was done and stayed all winter. My regular engine was the "Pegasus", 11x16" cylinders, 42" wheels. She was a

flyer and I made her fly. She just had to on theatre nights—Wednesday and Saturday—after leaving Lynn when it was time to be in Boston. At that I never delayed them over 20 minutes—10 miles. The “Pegasus” was built high and was top heavy, would roll and bound but rode well.

When the “Tomales” was finished for the North Pacific Coast R. R., she was shipped in knock down condition to California. Fred Shalling was there waiting for her. She (all dissected) got to South Framingham and was ordered home. Too heavy for the road. They widened her to standard, sold her to the Central R. R. of Minnesota, named her the “Mankato” and



Texas & Pacific Ry. #624 as rebuilt by Geo. A. Haggerty, who stands near the end of the tender.

got her out of the gate ready to go. I had come in from the Lynn road (spring of 1876) and received instructions to go with her. I sat in the cab ready to go on the turn-table when a wire was received from Mr. Mason who was in New York to hold her. I was then sent to Cortland, N. Y. on “important” business and when I got home I brought the “Leviathan” along with me. Then I soon went to the Peach Bottom Rwy.—Middle Division—with the No. 3, a narrow gauge, destination York, Pa. Spent July 4th, 1876 there, was there about a month, took in the Centennial too. Fred Shalling was still in California, up on the Stockton & Ione R. R. Mr. Mason kept him there a long long time. I came home on a quick call and do you know that the

"Mankato" had a new name—"Dixie Crosby" No. 22 for the Galveston, Harrisburg & San Antonio R. R. This road was the successor to the Buffalo, Bayou, Brazos & Colorado R. R. Harrisburg (now a part of Houston) to Columbus—85 miles, all owned by Mr. T. W. Pierce of Boston. San Antonio then had no railroad but Mr. Pierce gave them one. He bonded the old road in Europe and gave the road a new name. I took the "Dixie" to Houston and "we" helped build the road to San Antonio. The "Leviathan" came along in due time and I came home in the winter and got the 26 named the "H. B. Stowe." The "Leviathan", No. 24 by this time had become the "Commodore Garrison" yet with her lofty name and appearance we both knew each other having run together on the Utica, Ithica & Elmira when the late Henry Griggs, M. M. was in charge. I was a month getting to Houston with the "Stowe" caused by snow blockades in Vermont and New York State, getting off the track and other trouble. I remained nearly a year with those engines against odds I tell you, competing with new Hinkleys and Danforths. I ran all of mine and learned the men how to run them and care for them. The "Leviathan" was brought by Adams. There was much that took place there relative to those engines that today remains a secret. Adams rode with me one trip to Columbus, got frightened and came home. I invited him for a trip to scare him as his instructions were to deliver only. The "Leviathan" was just like the "William Mason". The "Dixie Crosby", after running a few years, blew up at San Antonio, a faithful colored fireman saw it at close range—driving wheels, parts of boiler, cab, sand box, stack and bell all flying in mid air, the bell ringing. The pontoon bridge across the Brazos and the high bridges across the Colorado built in quick sands did not appeal to Adams. I came home in 1877 and this was my last work for the Mason Machine Works. They did very well by me but times had been dull since 1873 and I felt I must try and do better. Mr. Shalling had preceded me by ten years to the B. B. B. & C. (the only name he knew it by) to Houston for McKay & Aldus (Healey) with four very nice little locomotives. I never saw much of him after the "Onward" was finished. I hired him as one of my assistants on the Texas & Pacific, located him at Texarkana and he did well. He must have been 87 years old when he died.

Yes, I am positive that the "Mattapoiset" was built by the Matfield Mfg. Co., East Bridgewater, Mass. Her builders name was in raised cast iron letters on the side of the dome base. Mr. Fairfield ran her and as a boy 51 years ago, I saw her here in 1866 many times. No doubt the Norfolk County trains ran to Dedham in 1866 and perhaps on in to Boston, but in March, 1868 when I rode with Zebadee Lord on the "Pioneer", they were using their own line under South Boston to the foot of Summer St., and the road from Dedham Jct., now Islington to the foot of Summer St., had no appearance of newness, nor did the station, yards or engine house. They had wisely built the line under South Boston for a double track and it was double track from Boston to Readville in 1875, and to Hartford in 1879.

Mr. Mason was the first to build and was the inventor of the cast iron saddle. He was the first to use the center bearing forward truck. He also brought the cylinders down to nearly horizontal. His had  $\frac{1}{8}$ " incline to the foot on all engines with 5' 0" drivers and over and  $\frac{1}{4}$ " for engines with wheels under 5 feet. Those Lehigh Valley engines had the  $\frac{1}{4}$ " incline. I have seen old Baldwins with the cylinders plastered half way up the smoke arch, not a sign of a saddle. I have seen about everything ever built. The Mason ten wheelers were the only ones ever built where the main rod took hold of the front crank pin.

With regards to the Atlantic, Mississippi & Ohio, I knew that road from end to end, Norfolk to Bristol, Tenn., 440 miles. The great nice brass pumps on those engines were pronounced useless. The road runs through the Blue Ridge and Allegheny mountains. When the Government equipment was removed in 1865-6 it was left with four old Norris locomotives and another named the "Peaks of Otter" from the beautiful mountains through which the road runs. She had to be seen to be appreciated. This road was a consolidation of the Norfolk & Petersburg, South Side R. R. from Petersburg to Lynchburg and the Virginia & Tennessee from Lynchburg to Bristol. There the East Tennessee, Virginia & Georgia took up the trail for Chattanooga and to Atlanta. Through the enterprise of Gen'l Wm. Mahone the Atlantic, Mississippi & Ohio was formed. He bought several Mason engines. When the bonds came due the road got its Receiver.

The Toledo & Illinois was the start of the Toledo, Wabash & Western, now part of the Wabash R. R. This road had many Mason engines.

When the Canadian Pacific took the New Brunswick road in 1890 all but the Fairlie engines were running. I inventoried over five millions dollars worth of equipment for the Canadian Pacific and no questions asked, but they soon set aside our lightest engines. I had engines on the road that were built in the United States, Canada, England and Scotland.

The Boston & Worcester R. R. had the Mason "Hero" with a ships anchor chain encircling the tender twice connecting with large anchors on each corner all in gold and wonderful shading. The B. & A. engines west of Worcester were built at Springfield by Wilson Eddy by the Company. Then there were the Fairbanks "Westerly" on the old Providence & Stonington, the "Miantonomo" built by Mason for the Hartford, Providence & Fishkill. All were beautiful machines.

The old "Rockville" was worn out on the Rockville Branch of the Hartford Providence & Fishkill. Rockville is about 30 miles southwest of here across the country.

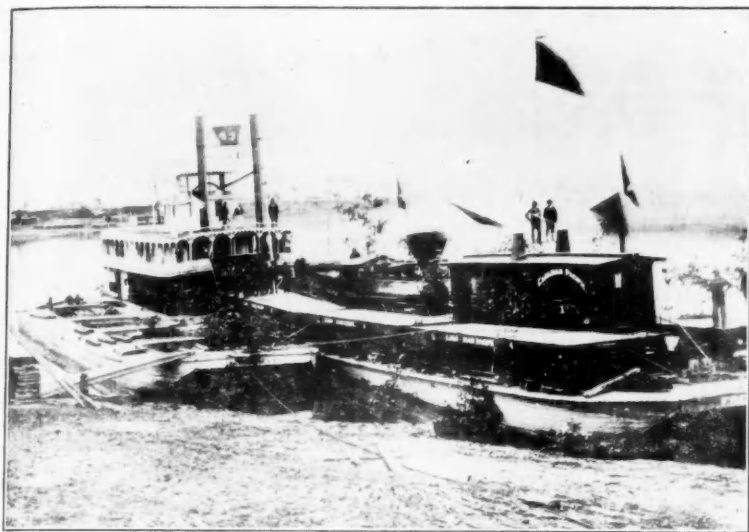
I may be able to identify the "Pup" in the little "John Ruff". I always thought "Pup" was a nickname for I do not remember seeing the name painted on her, but I do remember very distinctly of seeing the engine, the men calling her the "pup". She was the only single driver they ever had.

The "Uncas" was an inside freight engine and the "Norwich" and "Rockwell" of Norwich & Worcester fame were Norris engines with one pair of drivers and "Bury" boiler.

Hoping to hear from you again soon, I am,

Very truly yours,

GEO. A. HAGGERTY.



The arrival of the "Countess of Dufferin" at Winnipeg, Man.  
Courtesy of W. J. Healy.

This photo shows the "Countess of Dufferin" No. 1 of the C. P. R. arriving at Winnipeg on Oct. 9th, 1877, loaded on a barge attached to the Steamer "Selkirk", having come in this manner down the Red River from Fargo, North Dakota. A newspaper account published at the time reads in part as follows:—

"A series of wild, unearthly shrieks coming from the river at an early hour announced the approach of the sternwheeler "Selkirk," having barges attached in front and at the sides on which were mounted the locomotive, six flat cars and a van. The voyage downstream constituted one continuous triumphal progress from the International Boundary to Winnipeg, the settlers in the Red River Valley expressing the greatest excitement and most intense enthusiasm. The engine was kept under steam, so that her whistle might herald the approach of the iron horse to all within hearing. On passing Fort Pembina, the flotilla received a salute from the guns of the U. S. Artillery, and upon arrival at the town was met by the Captain commanding the Fort, together with his officers and associates on the Customs, not omitting the population en masse."

"About 9 A. M. on the morrow, the "Selkirk" with her novel freight, passed the mouth of the Assiniboine and as she swept by the infant City of Winnipeg, mill whistles were furiously blown and bells rung to welcome the first locomotive, destined to be the means of creating a new era in travel through the great Northwest. The "Selkirk" displayed handsome decorations in honour of the event, with Union Jacks, Stars and Stripes, and ban-

ners in addition to her own bunting; the leading barge was also included in the embellishment of the flotilla, being adorned with flags and evergreens."

"The whistles of the steamer and locomotive continued in full commission, with those of the mills joining in the chorus, the bells clanging merrily. It formed a remarkable coincidence that Joseph Whitehead, a contractor on the Pacific Railway, who was in charge of the locomotive on this interesting trip, acted as fireman on the engine that drew the first train over the initial public passenger railway opened in England—the Stockton and Darlington. Probably the event in Manitoba was no less important in its way than that with which Whitehead had been associated in Yorkshire so many years before."

"Shortly after the landing had been reached, three cheers were given for Whitehead, and a few minutes later a crowd swarmed on board, and subjected the locomotive to a most minute examination, the van and flat cars also coming in for a due share of attention. A couple of hours afterwards, when hundreds of visitors had taken advantage of the opportunity to make an inspection, the "Selkirk" steamed to a location below Point Douglas, where a track had been laid to the water's edge, by means of which the engine was run ashore on the St. Boniface side of the River."

After being used on construction work by the C. P. R., this loco. became the property of a lumber company in British Columbia, but finally reverted to the C. P. R., not for active service, but to be presented to the City of Winnipeg, and she now stands in the little park dedicated to Sir William Whyte, fronting the C. P. R. Station. In summertime the veteran presents a gay appearance, decked out with flower boxes, occupying a short length of track laid on the green sward and surrounded by trees and shrubs. A board placed in front of the smoke box exhibits this legend:—"This was the first railway locomotive to operate in Western Canada. Brought to Winnipeg from the United States by barge on the Red River in 1877 and ran between St. Boniface and Emerson."

Built by Baldwins, 1872.

NORMAN THOMPSON.

## Train Speeds and Safety in 1826

As Expounded in the Early Writings of Claudius Crozet.

By ELIZABETH O. CULLEN, *Reference Librarian,*

Bureau of Railway Economics, Washington, D. C.

Railroad tunnels through the Blue Ridge Mountains, descriptive geometry, and Napoleon's retreat from Moscow would at first glance seem to have no connection with each other or with the literature of early American railroading. Yet Colonel Claudius Crozet, a survivor of the retreat, built the famous tunnels on the Chesapeake and Ohio Railway west of Greenwood, Va., introduced the study of descriptive geometry into this country, and also contributed to the rare early railroad literature a relatively long discussion of railroads adapted to American conditions, including the greatest speeds consistent with safety at which trains could be operated.

Distinction characterized everything that Col. Crozet did. After graduation from L'Ecole Polytechnique, which in France has educated men for public services requiring "a profound knowledge of the mathematical, physical and chemical sciences" since 1794, he served in Napoleon's campaigns under Marshal Ney, even to Moscow and back, being one of the 25,000 to return of the 640,000 that Napoleon led eastward in the spring of 1812. Coming to the United States after Napoleon's downfall, Crozet was first Assistant Professor of Engineering at the United States Military Academy at West Point in 1816, and then from 1817 to 1823 head of the Department.

His services as "Principal Engineer" of the State public works of Virginia began in 1823 and it was during this period, in one of the earliest of his twenty-odd reports on canals, river improvements and turnpikes, that he devoted three pages (quarto size) to the subject of railways and the prudent speed of trains drawn by locomotives.

"Like everything new," he wrote in "Report of C. Crozet, Principal Engineer, on the Continuation of the Canal from Maiden's Adventure Falls to the Mouth of Dunlap's Creek" dated July 1, 1826, "they have had enthusiastic admirers and warm opponents.

"It is surprising, however, that such a diversity of opinions should have existed in regard to rail-ways, whose properties depend on the most elementary principles in the application of power. What is in fact a rail-way? A mere road, made of materials by which the resistance of friction is considerably reduced, whereby a propelling power to capable of more useful effort.

"Friction and inertia are, it is well known, the two great obstacles that engineers and mechanics have to overcome in the application of power. If it were not for the constant resistance opposed by friction, bodies once set in motion on a plane would never stop. A common road counteracts the pulling of horses by the considerable friction of the wheels; *M'Adamized* roads enable horses to draw heavier loads because of their greater smoothness, and a road of iron offering still less resistance, will of course admit of much heavier loads being transported by the same power.

"The resistance opposed by friction varied according to the nature of the substances placed in contact; it is proportional to the weight moved, and *remains the same whatever may be the velocity given*; in this last peculiarity consists the advantages of rail-ways.

\* \* \* \*

"But recently a new propelling power has been introduced, which, like friction remains the same, whatever may be the velocity; this is the locomotive engine. After having once set a train of waggons in motion, the engine will continue to act with constant and undiminished power, and will accelerate the speed of the whole train, until it has attained the maximum velocity that can be given to the wheels by the strokes of a piston. By increasing, therefore, the velocity of the rim of the wheels, by any means whatever, the speed of transportation on rail-ways might be increased *without limits*, by a propelling steam engine. Prudence alone fixes a limit to the velocity; a great swiftness on a straight road might occasion very serious accidents, but in curves it would be particularly dangerous. It seems admitted that a rate of speed of more than 6 miles an hour would exceed the bounds set by prudence, though some of the sanguine advocates of rail-ways would extend this limit to 9 miles an hour."

He went on to remark that local circumstances which might increase or lessen the danger should govern, and then to make

some observations anent the practicability of substituting a railway for the James River navigation improvements. He considered it impractical, "rail-ways are advantageous only when great speed is a desirable object" and the two miles per hour of canal transportation would suffice the needs of the James River country, "along which the trade is of a miscellaneous nature, the articles are bulky, more easily loaded on boats than on small waggons. The objects to be transported are scattered, and speed is not of so much consequence as economy of transportation".

Winter and droughts would have little effects, and so, Crozet continued, "the advantages of rail-ways, in this respect, are of no weight in this instance."

Some had mentioned the possibility of building a railway across the mountains—that wall of blue so distracting to traders because it baffled all attempts to effect mass transportation over them, and made even pack transport hazardous and expensive. Crozet concluded his report on the improvement from the romantically-named "Maiden's Adventure Falls" to the mouth of Dunlap's Creek with an exposition of practical considerations of any such an effort.

"In the first place, the mountains are so rugged and broken that the only practicable way to carry this plan into execution would be to follow the valley of some creek which leads up to the top of the dividing ridge. But here, all the difficulties presented in the valley of the James River would be greatly multiplied. The graduation of the road must be almost everywhere among cliffs; its windings would be more numerous and considerable, the deep cuts would be enormously expensive; and the stationary engines and inclined planes very frequent, &c; after having, at an immense expense, established the foundation of the rail-way, blocks of stone must be obtained, shaped and transported into a complete wilderness, and put in their place. Then castings must be obtained from a foundry at the rate of at least \$112 per ton, and transported an immense distance to this same wilderness, to form a rail-way perhaps 100 miles in length at the rate of nearly 100 tons of iron per mile, exclusive of fixed engines or machinery.

"In England, where facilities of all sorts are concentrated, where there exists an extensive practical knowledge of these things, the nice adjustment of rail-ways may not be thought an

object capable of having a material influence on the expense; but, among the mountains of Virginia, far from foundries, rails would have to be procured of particular shapes to suit each of the numerous curves of the road, and counteract the centrifugal force of the waggons on the turns.

“What the expense of rail-ways, made under circumstances so unfavourable, would be, I am not prepared to say; but, certain it is, that it would be immense; and that the present state of things would not justify it.”

Eighteen years before, Benjamin H. Latrobe had attached to his letter to Albert Gallatin, afterwards printed in the Gallatin report on internal improvements in 1808, a postscript, dated April 1, 1808, which is the first mention of railroads in American literature. He gave an estimate of cost per mile for a railroad suited to American requirements, amounting to \$10,000 per mile for double track, but stated “But the sort of produce which is carried to our markets is collected from such scattered points, and comes by such a diversity of routes, that railroads are out of the question as to the carriage of common articles. Railroads leading from the coal mines to the margin of James River might answer their expense, or others from the marble quarries near Philadelphia to the Schuylkill. But these are the only instances within my knowledge, in which they at present might be employed.”

Four years after Latrobe's postscript, there were published in New York, Col. John Stevens' “Documents Tending to Prove the Superior Advantages of Rail-Ways and Steam Carriages over Canal Navigation”, comprising correspondence with the Erie Canal Commissioners and others with respect to a railroad across New York State instead of the Erie Canal. Col. Stevens' idea of speed was quite different from that of Col. Crozet's, expressed fourteen years later. “To the rapidity of the motion of a steam-carriage on these rail-ways, no definite limit can be set \* \* \* I can see nothing to hinder a steam-carriage from moving on these ways with a velocity of one hundred miles an hour.” However, he observed in a footnote: “This astonishing velocity is considered here as merely possible. It is probable that it may not in practice be convenient to exceed twenty or thirty miles per hour.”

Twenty-seven years after Crozet's report of 1826, the state of things justified the State of Virginia in chartering the Blue

Ridge Railroad to cross the mountains, and Colonel Claudius Crozet, as Principal Engineer, surveyed the route from near Mechum's River, Albemarle County, to Waynesboro, in Augusta County, and built the four tunnels known by his name.

Into the intervening years he had crowded many things. In 1831 he left Virginia for Louisiana, but returned after a time and his "Report of the Principal Engineer on the Virginia and Tennessee Railroad," printed as a document of the Virginia House of Delegates early in 1838, resumed the series of his reports that are a valuable contribution to Virginia economic and engineering history. In 1839, the opening of the Virginia Military Institute found him as president of the first Board of Visitors. He had introduced descriptive geometry and the blackboard at West Point twenty-two years earlier, and to the new school he gave the benefits of his wide experience in organization, discipline and teaching and the design of the cadets' uniform, which he adopted from the uniform worn by the cadets of his own school, L'Ecole Polytechnique.

Meanwhile, his surveys and locations continued, only railways took the place of canals, although there was still much attention paid to improving roads. The Virginia documents of the period from 1838 to 1857 include twenty-four important reports written by Crozet, of which the reports of the progress of the Blue Ridge Railroad and its tunnels are the most interesting.

Not only were the tunnels completed between 1853 and 1858, but the existing knowledge of the geology of the State of Virginia was added to extensively, and, to the railroad company, expensively. The successive formations of clay, soft pan, rotten slate, hard rock, and veins of water necessitating installation of horse-power pumping machinery, offered so formidable a series of dangers and obstacles that the wonder is that the work was not abandoned. There were no steam drills, dumping carts, modern blasting powder, and other labor-saving appliances in the 1850s. The reason for the successful completion was, of course, the indomitable personality of Colonel Claudius Crozet.

A photograph shows a fine-looking man, whose bearing would attract favorable attention in any gathering. A keen sense of humor is indicated by the expression of the eyes and mouth. He seems to have been immensely popular with his contemporaries.

He died in Richmond in 1862, and lies in an unmarked grave in Shoekoe Hill Cemetery. The sabre he wore during his service in Napoleon's Grand Army, and his Legion of Honor cross, pinned upon him by Napoleon himself, were given by his granddaughter some years ago to the United States Military Academy at West Point, which also possesses the manuscript of his textbook on mathematics. The Virginia State Library at Richmond owns an extensive collection of his engineering and railroad writings, while the Library of the Bureau of Railway Economics in Washington, and private collectors in Richmond and New York have smaller collections of this eminent adopted son of the United States.

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### **Railway Correspondence & Travel Society**

Possibly some of our members may be interested to learn about this Society, the headquarters of which are in England. This Society has a growing membership, the purpose of which is an interchange of views on all subjects relating to the locomotive and the railroad, whether it be modern or historical. One interesting feature is the visits to the various locomotive shops by the members. Arrangements are made in advance and as many of the members possible as can attend, are escorted through the various locomotive shops and works in the Kingdom. This Society has no American Representative but communications can be addressed either to Mr. A. E. Broad, Hon. Secretary, Railway Correspondence & Travel Society, 5 Pittville Terrace, Cheltenham Spa, England or to Mr. G. W. Bishop, our own English Representative. Mr. Broad has recently joined our own Society and those of our members who wish to get in touch with "our kin across the water" are urged to do so.

## The Beginning of S. P.

By D. L. JOSLYN.

Driving of the "last spike" at Promontory, Utah, on May 10th, 1869, uniting the Central Pacific and Union Pacific in the first transcontinental Railroad, ended the first epoch, in Western R. R. building.

On that day there was less than four hundred miles of railroad in the far West, aside from the main line of the Central Pacific. There was not a mile of railroad in operation in Oregon. One company, it is true, had graded a few miles in the vicinity of Portland, but it was not until December 1869 that the Oregon Central had twenty miles in operation.

Although Los Angeles at that period did not have a railroad, work was progressing on the 22 mile line between Los Angeles and Willington, which was opened for traffic on October 26th, 1869.

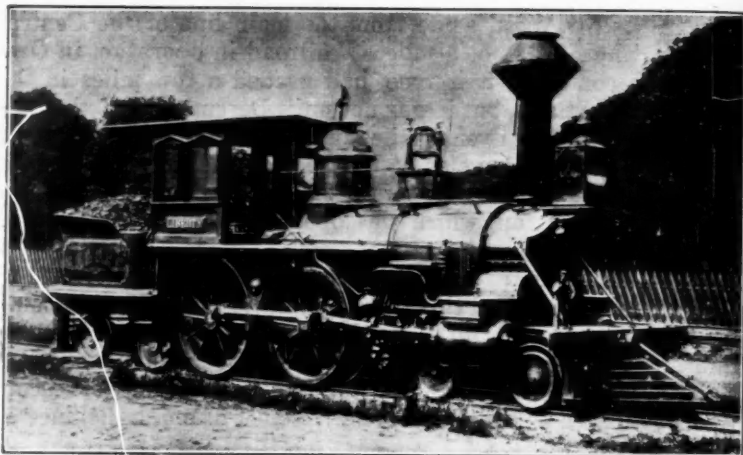
The Sacramento Valley Railroad had built to Folsom, 22 miles distance, and had this line in operation in 1856, this being the first road to operate in the West. The California Central Railroad was incorporated April 21st, 1857. Construction work started the following year, and the line was opened to Lincoln via Junction (now called Roseville) from Folsom, a distance of 18½ miles.

Insolvency of this road followed shortly and the Yuba Railroad Co. was incorporated in Nov. 1862 and carried on the building of the road towards Marysville, as far as funds permitted. The Central Pacific took over this line and completed it to Marysville in 1868. It was not until June 1st, 1869, however, before trains were operated through from Sacramento to Marysville. That portion of the line between Folsom and Roseville was abandoned in October 1867.

As has been mentioned in a previous bulletin, the California Pacific Railroad, had built a line from Marysville to Vallejo and from Sacramento to Davisville to connect with the Marysville line. This road was built on light dirt fills and from Yuba City to Knights Landing was over a marshy land. That portion of the line was washed out in 1871 and abandoned in December 1871, and was not rebuilt until 1891.

The Napa Valley R. R. built a 4½ mile road from Napa Junction on the California Pacific to Napa, opening this line on

July 10, 1865. During 1867 this company started to extend this line from Napa to Calistoga, about 26 miles distant. This line was opened for traffic in August, 1868. This road was obtained by the California Pacific in May, 1869. In 1871 the California Pacific took over the San Francisco and North Pacific R. R. This consisted of about 23 miles of road extending from Donohue Landing on Petaluma Creek North to Santa Rosa.



San Francisco and Oakland Ry. "Liberty" No. 1, built by Mr. Young at Oakland Point, Calif., 1863. Photo courtesy of Mr. W. E. Gardiner.

Under the name of the California Pacific Eastern Extension Company which was incorporated May 23, 1871, the last project of the California Pacific was launched. Capital stock was fixed at \$50,000,000, and it was proposed to build a road commencing at Davisville, thence passing through the Sacramento Valley, bearing to the Northeast, entering Oregon near Goose Lake. From the latter point the line was to continue North to Christmas Lake, Oregon, and thence East into Idaho, and thence Southerly terminating at Ogden. Nothing ever came of this and in August, 1871, the major portion of the Calif. Pacific Stock was sold to the Central Pacific interests. It continued to be operated as a separate line until July 1876 when it was leased to the Central Pacific and in 1898, the existence of the Calif. Pacific was terminated in the general consolidation of companies to form the Southern Pacific Railroad Company. Meanwhile

the San Francisco and North Pacific Railroad had been extended from Santa Rosa to Cloverdale in 1871 and 72 and in the following year was sold back to Peter Donahue.

During 1878 the Northern Railway was opened from Oakland to Port Costa by the Central Pacific and in the following year from Benicia to Suisun where connection was made with the Calif. Pacific to Sacramento. In Dec. 1879 the Car Ferry "Solano" made its first trip from Port Costa to Benicia transporting trains across Carquinez Straits.

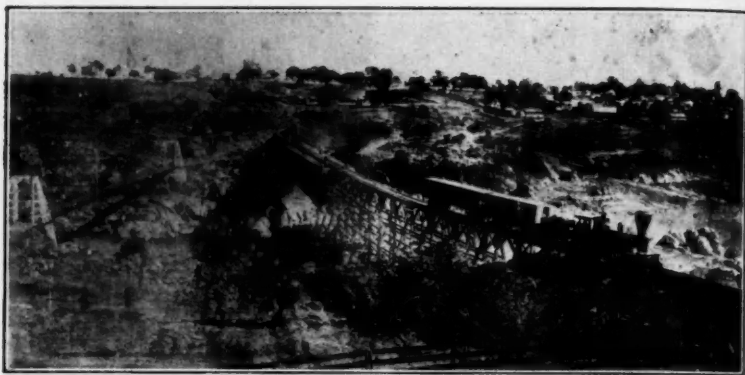
The California Northern Railroad was incorporated in June, 1860, and placed in operation 26 miles of track between Marysville and Oroville in Feb. 1864. This road was acquired by the Central Pacific interests, and under the name of the Northern California Railway Company, incorporated Sept., 1888, rebuilt the 27 miles between Marysville and Knights Landing, replacing the old main line of the Calif. Pacific which had washed out in 1871.

The San Francisco and San Jose Railroad was projected in 1849, but was not organized until Sept. 1851 and as organized was called the Pacific and Atlantic Railroad. Money was hard to get and the project lay dormant until Oct. 1853, when it was reorganized with a capital stock of \$2,000,000. Again no headway was made and it was not until 1859 that the enterprise was again taken up, this time as the San Francisco and San Jose Railroad. The Company was again dissolved and a fourth organization formed and incorporated August 18, 1860.

Ground was broken in 1861, at San Francisquito Creek on the road South, and on October 18, 1863, the first train passed from 18th and Valencia Streets in San Francisco to Mayfield. One train a day was operated over this route and a few days later an additional train was put on to Menlo Park. The construction of the line was pushed along with vigor, and on January 16, 1864 the line was completed to San Jose.

The Company started business with three locomotives and about three dozen passenger and freight cars of various descriptions. The first locomotive to operate over this road was the "San Matio" "E" of the Western Pacific, and was no doubt leased from that road. Two other loco's arrived from the East via sailing vessels, the "A. H. Houston" and the Chas. McLaughlin. I have no record of these latter two, but the "San Mateo" was an 8 wheeler built by Baldwin.

The San Francisco and Oakland Railroad was placed in operation Sept. 2, 1863 and consisted of a ferry boat from San Francisco to Oakland Wharf from whence a train operated to 7th and Broadway, later being built into East Oakland. The first engine used on this line was a small 4-4-4 engine built at Oakland Point by a Mr. Young. In this connection some historians have credited Mr. C. W. Stevens with having built this engine, but history says it was built by Mr. Young.



California Central (Sierra R. R.) R. R. at Folsom 1858. Norris Engine.

The San Francisco and Alameda Railroad was opened for traffic from the wharf at the front of Pacific Street in Alameda to High Street and the first trip was made August 13, 1864 with the locomotive "E. B. Mastick."

This road was extended to San Leandro in Jan. 1865 and to Hayward, Aug. 24th, 1865. The railroad had at that time two locomotives, the "E. B. Mastick" built at the Vulcan Iron Works in San Francisco in 1864 and the "F. D. Atherton", no record of where built. The "J. G. Kellogg" was completed at the company shops, under the supervision of Mr. A. J. Stevens in January, 1866.

These two roads are still in operation as a part of the Southern Pacific local system, but have long since been joined, extended, and electrified.

As has been told before, the Western Pacific R. R. was completed through from Sacramento to Oakland in 1869 and the Central Pacific operated their transcontinental trains over its

tracks. The Central Pacific had gained control of this road in 1867 and assisted in finishing the line from Niles to Hayward where connection was made with the San Francisco and Alameda R. R. The first "Solid" Pullman train arrived at Alameda Wharf October 22, 1869 after a run of six and a half days from New York, stopping only for fuel and water and operating stops.

It is interesting to note at this time that the first through train consisted of the Reception Car "San Francisco", Hotel Car, "Elkhorn Club" and Drawing Room Cars "Orleans" and "Auburn."

The tracks of the Alameda line and Oakland line were finally joined Oct. 28, 1869 and Oakland became the terminus of the Central Pacific in place of Alameda. That morning the Central Pacific locomotive "Reindeer" took a construction train through Oakland to the Wharf at Oakland Point. On November 8, 1869 the first through Overland passenger train arrived at Oakland Wharf.

The Central Pacific later on began to look for a shorter route to Sacramento and under the name "The Northern Railway Company" built a line through West Oakland to Shellmound, opened for traffic Aug. 16, 1876.

"The Berkeley Branch Railroad Company" built a line from Shellmound to Berkeley via Stanford Ave., Adeline St. and Shattuck Ave. to University avenue. This was completed in 1876 and gave Berkeley its first railroad.

The new main line of the Central Pacific was finally completed, along the shores of San Francisco and San Pablo Bays, to Port Costa and thence across the straits to Benicia, thence to Suisun, across the Salt Marshes of Suisun Bay, where connection was made with the Calif. Pacific.

The South Pacific Coast Railroad Co. (narrow gauge) started out with the intention of building from Alameda to Salinas Valley, across the coast range through Pacheco Pass where it intended to meet the Denver and Rio Grande, which at that time was building a narrow gauge railroad west. The S. P. Co. was built under the following names: The "Santa Cruz and Felton", "Bay and Coast", "Oakland Township", "San Francisco and Colorado River", "Felton and Pescadero", and the "Alameda Branch Railroad." First section of this road was opened from Santa Cruz to "Old" Felton Oct. 13, 1875. This line was joined

near Big Trees May 15, 1880, by a line from the North extending from Dumbarton Point near Newark through San Jose and Los Gatos. In 1878 the wharf was completed at Alameda Point and service opened to Newark June 1st, 1878. This line was later extended to 14th and Franklin Streets in Oakland. On May 27, 1888 these lines were all consolidated under the South Pacific Coast Railway Company, and July 1st, 1888 the company leased its narrow gauge railroad to the Southern Pacific Company, which company had also on April 1st, 1885 taken over operation of all Central Pacific and Associated lines.



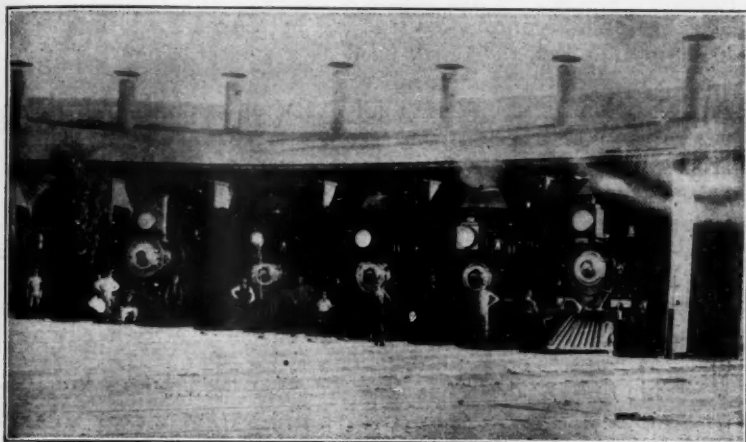
California Pacific R. R. at Calistoga 1887. Mason Engine.

The South Pacific Coast was finally broad-gauged in 1907. The Southern Pacific Railroad Company which was destined to later become the Great Southern Pacific Co. of today, was incorporated Dec. 2, 1865 under the laws of California, to build from San Francisco Bay, South to San Diego County to a junction at the State line with a contemplated road from the Mississippi River. This road reorganized as a second trans-continental railroad by an act of Congress July, 1866. The company filed a map designating their route and congress approved this by a resolution on June 28, 1870. The Southern Pacific acquired the San Francisco and San Jose Railroad Company and on April 21, 1868 ground was broken at San Jose for the extension to Gilroy.

This work was carried on by the Santa Clara and Pajaro Valley Railroad and was completed March 13, 1869. From Gil-

roy the Southern Pacific built to Tres Pinos reaching there Aug. 12, 1873.

By this time the Central Pacific had acquired a controlling interest in the budding Young Railroad. This became a matter of official record on Oct. 12, 1870, when the San Francisco and San Jose Railroad Co., the Santa Clara and Pajaro Valley Railroad Co. and the California Southern Railroad Company consolidated to form a new Southern Pacific Railroad Company.



**Southern Pacific Round House at Latrobe 1884. Photo courtesy S. P. News Bureau.**

From that date ownership and control of the Central and Southern Pacific were in the hands of the same men. Following consolidation of the Southern & Central Pacific the line down the Valley towards Los Angeles was built from Lathrop on the Western Pacific to Goshen by the Central Pacific and from Goshen on by the Southern Pacific, although the two lines were one. The building of this line started at Lathrop on Dec. 31, 1869 and had reached Goshen during the summer of 1872.

From Goshen the line was built under the name of the Southern Pacific in order to take advantage of land grants and rights of way given to the Southern Pacific. North of Goshen there were no land grants or government loans, but the Central Pacific pushed on and built this 146 miles from their own resources.

The trains began to operate over this line on the following dates: To Modesto in Nov. 1870, to Merced in January 1872; to Sycamore in April, 1872; and to Fresno in May, 1872, and finally to Goshen July, 1872.

A number of minor roads were built out of Stockton which later became part of S. P. and while some are still branch lines, there are others that became part of the main line.

The Southern Pacific pushed the line ahead with vigor and steadily climbed the Tehachapi Mountains and one of the engineering fetes accomplished was the building of the famous Tehachapi Loop which is still used as a means of getting up the steep slopes of the Mountain.

The Southern Pacific finally reached a place called Lang where the construction crew from the North met the builders from the South and a fitting ceremony was held, and the last spike driven after an exciting race was held by the two construction crews to close the 1500 foot gap between the two ends of the line. To Chas. Crocker went the honor of driving the last spike which was of gold and had been presented by L. W. Thatcher, a Los Angeles Jeweler.

Regular train service was started between San Francisco and Los Angeles on Sept. 6, 1876.

This line is now called the San Joaquin Valley Line of the S. P., and is a very pretty trip from San Francisco. Leaving San Francisco on the ferry we connect with the train at Oakland Mole and from thence along the bay over the road built by the Northern Pacific Co. to Port Costa, from there to Tracy over the road built by San Pablo and Tulare R. R. Co., which was completed in 1878. From Tracy over the road built by the Western Pacific to Lathrop and from Lathrop to Goshen Junction (as it is now called) over the road built by the Central Pacific; from there to Los Angeles over the road built by the Southern Pacific.

Of course this is all Southern Pacific now.

\* \* \* \*

The writer is indebted for the information in the above article to Mr. Erle Heath, Editor of the Southern Pacific Bulletin and published in that magazine.

# Historical Notes on Locomotive Design

## II. 1840-1890.

By E. G. YOUNG

A convenient and logical method of tracing the history of locomotive development through a given period is that of considering in turn each type of engine which was in use, rather than to follow chronologically the introduction and use of the various types simultaneously. A bird's-eye view of the half century from 1840 to 1890 shows the growth of the machine as a whole to conform to constantly-increasing traffic demands, the improvement of details innumerable, the standardization of the structural form, and the incorporation of a large number of minor improvements, so that while in principle the locomotive of 1890 and that of 1840 were identical and there was a general similarity in the form and arrangement of the most important parts, they had little else in common.

The first of the present standard types to be introduced was the eight-wheeled or "American" type, the Campbell engine previously referred to being the first of these. Locomotives with six-coupled driving wheels had been in use in England since 1827, but the first in America was not built until 1844. To this type was added in 1846 the double leading-truck, and thus was produced the first engine of the ten-wheel type. In 1861 the single engine-truck of the Bissel or radial type was invented, and the combination of this truck with the six-driver engine produced the Mogul. The first eight-driver engine was built in England in 1815, but the type did not come into use in this country until 1844. From this wheel arrangement the Consolidation type was evolved by the addition of the Bissell truck in 1867. The use of ten drivers was tried in the late sixties, without much success, but a satisfactory Decapod was produced in 1885, this engine also having the single leading-truck.

\* \* \* \*

American locomotive history through this half century may be very conveniently written around the development of the eight-wheeled American type. The record is continuous and complete, for this is the type of the greatest importance at the beginning as well as at the end of the period. The successive improvements in form and detail illustrate excellently the trend of the practice of the time with regard to locomotives in general. The

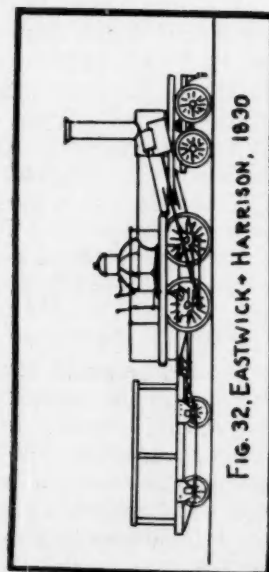


FIG. 32, EASTWICK & HARRISON, 1830

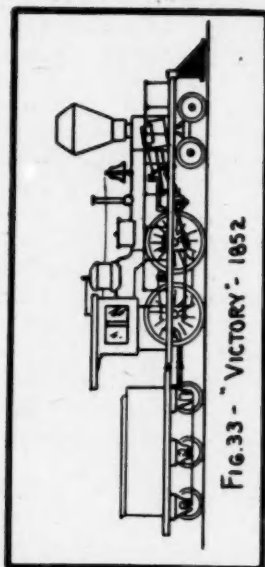


FIG. 33 - "VICTORY", 1852

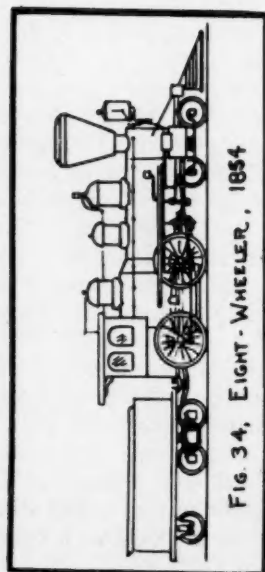


FIG. 34, EIGHT-WHEELER, 1854

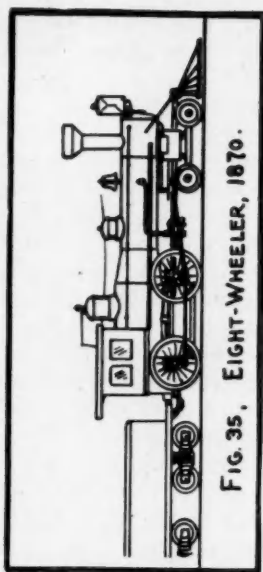


FIG. 35, EIGHT-WHEELER, 1870.

first of the series of American engines has been referred to: its rigidity rendered it unsuitable for the light and uneven track of the day. This problem was solved by the invention of the equalizing beam, by the use of which an even distribution of the weight on the drivers was assured. The Eastwick and Harrison engine (of Fig. 32) was the first to embody this improvement. The outside cylinders set above the center line of the drivers and slanting was the usual practice, but this position outside of the frame was an innovation. Other characteristics of this engine which are representative are the tall, straight stack, the dome-topped firebox, independent cut-off valves and the lack of shelter for the enginemmen. This engine was followed by many others nearly identical, the first important changes being the general adoption of the "hook-motion" valve gear (by which the cut-off could be regulated without the use of an auxiliary valve) and the substitution of the "balloon" stack for the smaller one. Both of these changes came in the early forties. The "Victory" (Fig. 33) has two notable features: the use of the shifting-link valve motion, and its cab. Crude cabs seem to have been used as early as 1844, but they were not generally adopted until after 1850. Fig. 34 shows an engine of 1854, two more modern features having been attained; these are the wide spacing of the engine-truck wheels, and the horizontal cylinders. By this time another important change had been made in the method of supplying the feed water: a pump driven by the cross-head, mounted on the guides had been generally adopted in place of the "half-stroke" pump (driven by a return-crank on the rear crank-pin) of the older machines. The day of the Victory marks the beginning of the period of elaborate ornamentation: polished brass-work, and brilliant painting and striping. Fig. 34 shows a typical engine of 1860. Changes in the arrangement of hand-rails and running-boards, the shape of the top of the firebox and other details show a rapid approach toward the construction standards of the end of the period. The last two engines have been dominated by their immense cone-stacks; this form gave way in the later seventies to the "diamond-stack." This latter, as well as other characteristics of the end of the periods, are shown in Fig. 36, representing an engine of 1885.

\* \* \* \* \*

The first six-driver engine built in America was a "Winans Camel," so called from its builder and the location of the driv-

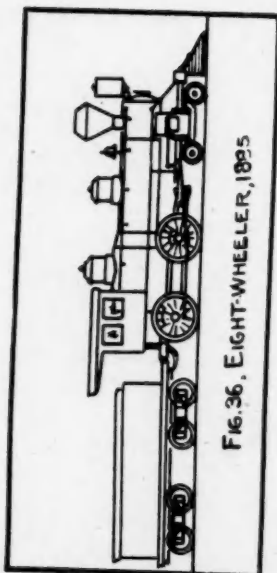


FIG. 36, EIGHT-WHEELER, 1895

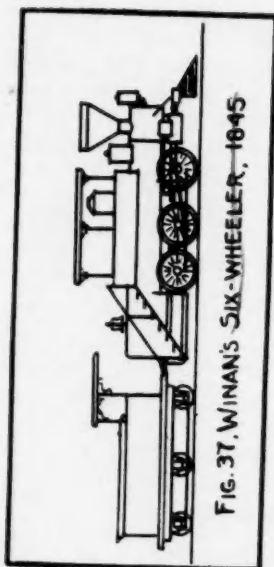


FIG. 37, WINAN'S SIX-WHEELER, 1845

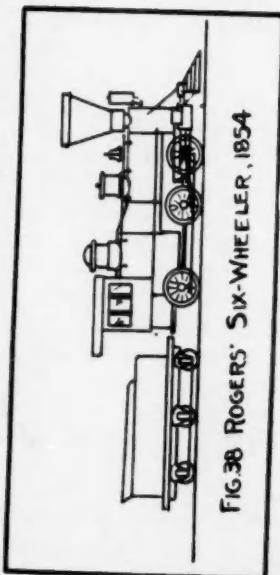


FIG. 38 ROGERS' SIX-WHEELER, 1854

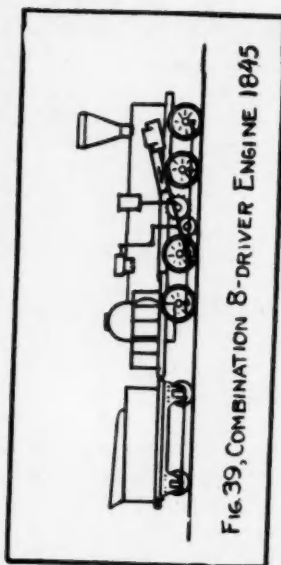


FIG. 39, COMBINATION 8-DRIVER ENGINE 1845

er's platform or rudimentary cab. This type is illustrated by Fig. 37. A later form, and one more in accord with the usual construction standards is shown in Fig. 38. The six-wheel engine ceased to be of importance as a road engine with the introduction of the "ten-wheeler," but survives at the end of the period as the standard yard-engine for heavy service.

\* \* \* \* \*

The first engines of the ten-wheel type were built in 1846 by Rogers for export to Cuba. The same year this type was introduced on American roads. It was of very small importance until about 1870 when the type began to gain in importance for heavy freight service. In the eighties passenger ten-wheelers began to be built, especially for the new western railroads with their heavy grades.

\* \* \* \* \*

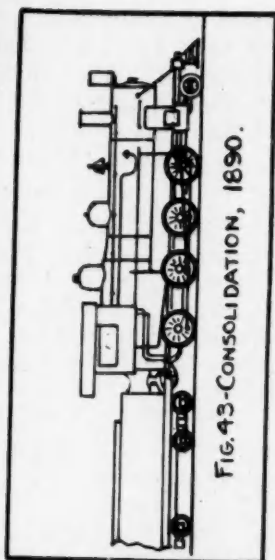
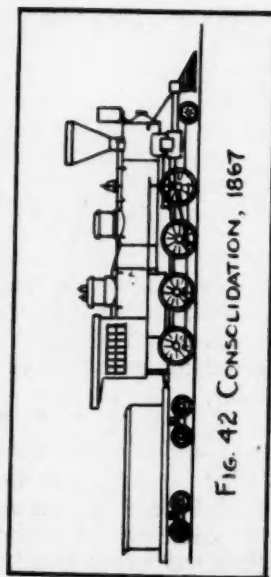
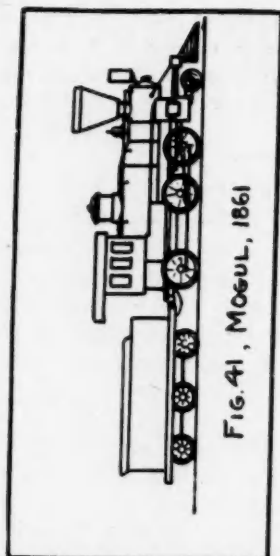
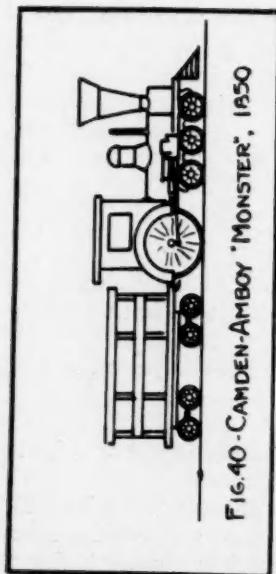
Winans built the first eight-coupled engine in America in 1844; this was also a "camel," similar to Fig. 37. These engines were built for heavy service in the mountain sections of the line of the Baltimore and Ohio. In Fig. 39 is seen an interesting variation of the eight-coupled type, a combined rack and adhesion engine built for the Madison and Indianapolis to work on a 6 per cent grade. This engine had five cylinders—two to drive the coupled wheels as in the ordinary adhesion locomotive; two to drive the pinion meshing with a rack between the rails, and a fifth to hold this pinion in contact with the rack when desired. There was little demand for so powerful an engine as the use of eight drivers produced until after the introduction of the Consolidation type in 1867, so that the eight-driver type has never been of great importance as a road engine.

\* \* \* \* \*

The first Mogul engine was built at the Baldwin Works in 1861, being a six-driver type with the addition of a single pair of leading wheels. The type rapidly gained in favor and continues of great importance to the end of the period as a standard freight hauler.

\* \* \* \* \*

The first engine of the Consolidation type was built by the Lehigh Valley in 1867, and was more directly a development from the Mogul than from the old eight-driver engine. This type represents a combination of the design and service characteristics of both of those mentioned, handling heavier trains than the



capacity of the former admitted with a greater degree of flexibility than the latter possessed. The Consolidation increased in importance during the latter years of the period.

\* \* \* \* \*

Many of the single-driver engines built previous to 1840 remained in service when the half century under consideration began, but very few were built afterward. Notable among these few were the "Monsters" of the Camden and Amboy Railroad (Fig. 40). In 1842 the "Stockbridge" (Fig. 29) was built by the Rogers Works, probably the first case of the use of trailing wheels arranged and serving the same purpose as at present. In the last ten years of the period there was some experimenting with single-driver engines (Fig. 51), but this work was in reality part of the development of the Atlantic type, and will be considered later.

\* \* \* \* \*

The "Decapod" type had its beginning in an engine built about 1870 by the Lehigh Valley, having a leading truck and ten-coupled drivers. It seems to have remained unique until 1885, when a similarly arranged locomotive was built by the Baldwin Works for service in Brazil. Prior to 1890 a few more were built, but the number was so limited that this type logically belongs to the next period. (See Fig. 44.)

\* \* \* \* \*

In 1890 we find four types of engines hauling virtually all of the traffic of the country. These were the American and Ten-wheeler in passenger service, and the Ten-wheeler, Mogul and Consolidation in freight traffic.\* In addition, the four- and six-coupled types without leading-trucks were in general use for switching service. The most notable features of the 50 years' progress were these:

An increase in weight ranging from 100 to 300 per cent, and a corresponding increase in tractive power: a weight of 60 tons with a tractive force of 24,000 representing a large engine in 1890.

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\*There were also several types of "Forney" engines in use on elevated lines and in suburban traffic, but these are of minor importance and have had little if any influence on later developments. These engines had four or six coupled driving-wheels, a leading-truck, and four or six carrying-wheels at the back end, taking the weight of the small coal-box and tank on the same frame as the boiler.

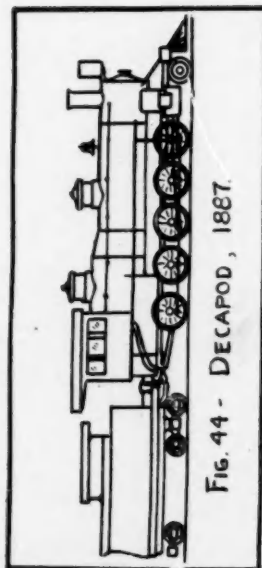


FIG. 44 - DECAPOD, 1887.

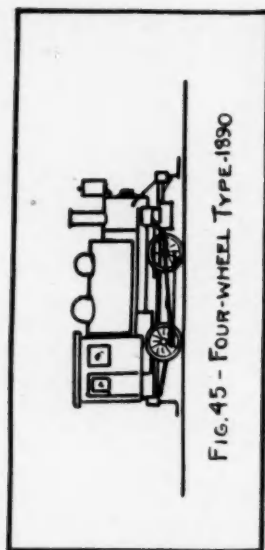


FIG. 45 - FOUR-WHEEL TYPE-1890

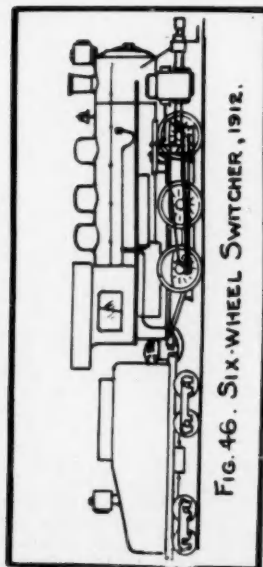


FIG. 46. SIX-WHEEL SWITCHER, 1912.

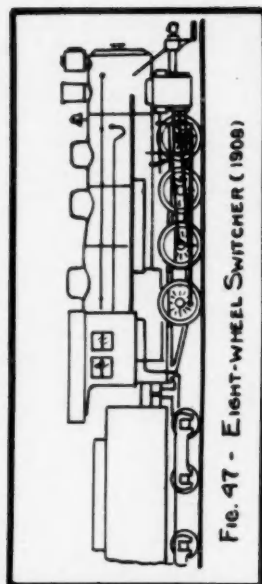


FIG. 47 - EIGHT-WHEEL SWITCHER (1908)

The general discarding (between 1840 and 1860) of the various early forms of valve gears, such as the hook-motion, and the adoption of the Stephenson shifting link. With the older forms of gear also went the independent cut-off valves.

Abandonment of wood as fuel; this removed the need for the large balloon- and cone-stacks. These were followed by the diamond or spark-arresting stack; this in turn was made obsolete during the eighties by the adoption of spark-catching nettings within the boiler.

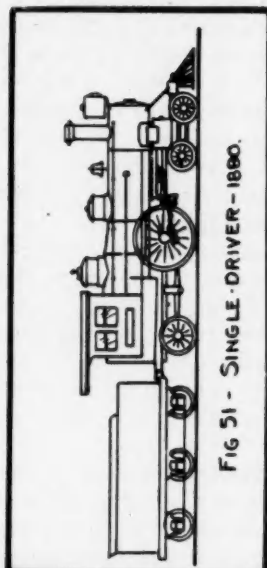
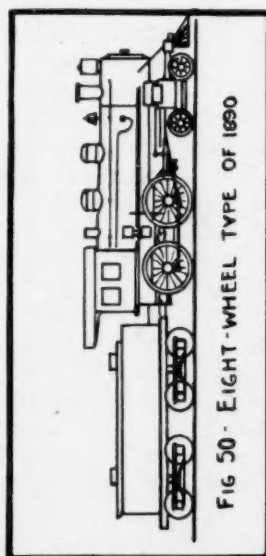
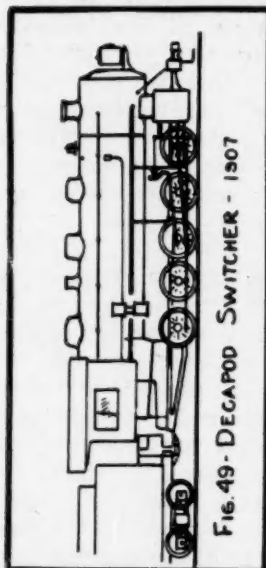
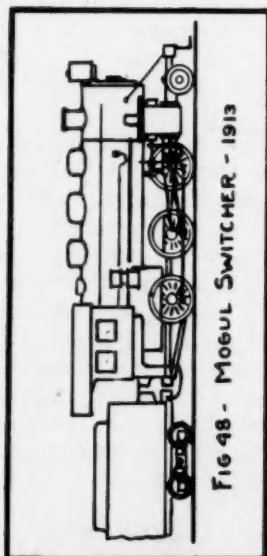
The adoption of the air-brake, after 1876. All through the period there was more or less experimenting with steam-operated driving-brakes, or "steam-jams," but as late as the sixties no general provision was made for the retarding of the locomotive except the hand-brakes on the tender.

The abandonment of the "half-stroke" or return-crank pump for the cross-head feed-pump, and of that in turn for the injector. The injector was first used for locomotive service in the early eighties, and by 1890 its use was general.

The first shelters of any kind for the enginemen seem to have been on the Winans Camels, and the cab on the boiler ahead of the firebox has continued in use till the present, though now obsolescent. The "Gov. Paine" of 1848 (Fig. 30) had a cab of the form that soon came into general use. The opposition of the enginemen themselves retarded its general adoption.

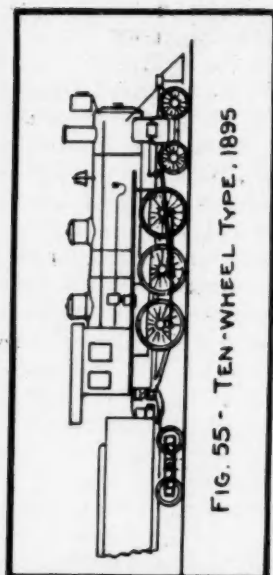
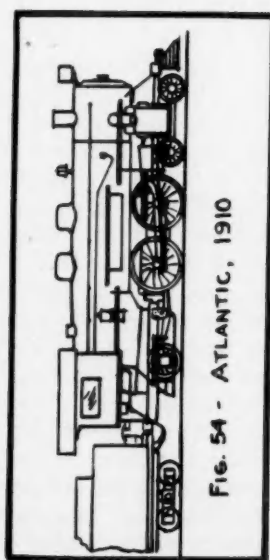
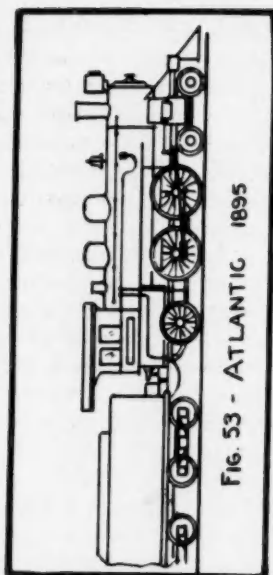
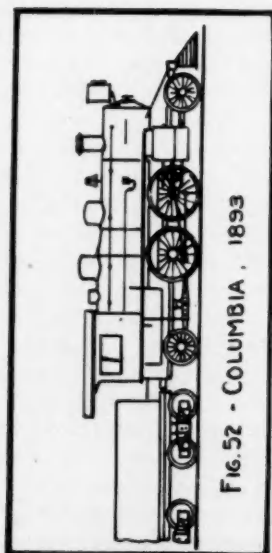
### III. 1890-1916.

The later development of the various classes of locomotives is best followed by considering the service to which each is put. The beginning of the period, as has been stated, found the four-wheeled and six-wheeled switcher in common use for yard service. For many years this class of power was the most poorly designed, poorly built, and poorly maintained of any in use, but in later years motive-power officials have seen the mistake of this policy, and the design of the yard engine is receiving the attention it deserves. Eight-coupled switchers came into use about 1900, and with the operation of "hump" yards they have become a necessity. In some cases still heavier engines have been used: a few ten-coupled switchers have been built, and the Mallet type has been employed satisfactorily. (See Figs. 45—49.)



In 1890, the dominant type of locomotive for passenger service was the Eight-wheeler or American, with the Ten-wheeler in use where the service requirements were very severe. The most famous of all American engines, the 999 of the Empire State Express, represents the most advanced construction of this type, until the Reading in 1914 built a very heavy and powerful class of engines, with all modern appliances. For general service, this was an ideal engine for the requirements of the early part of the period, but the increase of train-loads, and particularly the demand for spectacular speed, brought a situation that these locomotives could scarcely fill. This demand was a double one: first for an engine suitable for passenger service at moderate speeds with heavy trains; second, for one capable of handling moderate loads at the highest speeds, calling for better steaming capacity than had as yet been attained. The first demand brought about the general adoption of the Ten-wheel type for heavy passenger service, and the latter brought, after other types had been experimented with, the Atlantic.

To accomplish the end of very high speeds, the Long Island Railroad tried the single-driver type, which had been revived in 1880 (Fig. 51), with a double engine-truck and a pair of trailing-wheels, patterned after the famous English "singles." This engine with its high drivers could make any speed that was needed, and the boiler, with its large and deep firebox, was capable of meeting any possible demand for steam. But with a tractive force limited to about 10,000 pounds, the train-weight limit was low and rapid acceleration impossible. Four cars was the maximum load. To increase the hauling capacity, a new type was tried. In 1892 the Baldwin Works turned out the "Columbia" (Fig. 52), having a single leading-truck, four drivers, and a pair of trailing-wheels. Here were combined good steaming ability at the highest speeds with the power to handle a reasonable train-load, but extensive trials of this and similar engines proved that they were unsafe on curves at any but moderate speeds on account of the deficient guiding properties of the single engine-truck. In 1895 the obvious remedy was applied, and the Baldwin Works built for the Atlantic City Railroad an engine like the Columbia, but having a double leading-truck. Here was the beginning of the "Atlantic" type (Fig. 53). However, the ability of the American and Ten-wheel types to make the great majority of passenger hauls satisfactorily precluded any general use of this type for several years to come. After



1900 they were built in increasing numbers, and for several years this was the standard passenger type of the country for all but the heaviest trains. As the demand for steaming capacity continued and the weight of trains increased, there was further experimenting, and, for a time, a tendency to return to the Ten-wheel type. Another design of engines for passenger service was produced, having a wheel arrangement which had already been used to some extent in fast-freight traffic. This new type was the "Prarie," the Mogul with the addition of a pair of trailing-wheels under the firebox. This engine had the requisite tractive force, but was unsatisfactory in high-speed service for the same reason that the "Columbia" had failed: deficient curving ability in the single leading-truck. This type, however, found much more favor than the Columbia, a dozen roads ordering from one engine to two hundred each.

In the final choice of a type to supersede the Atlantic for heavy service history repeated itself, and the "Prarie" arrangement of drivers and trailing-wheels was combined with a double engine-truck. The first engine of this type was the Strong "Duplex," built in 1887, but on account of its many other peculiarities it found no favor. In 1893 the Rhode Island Locomotive Works built some heavy Ten-wheelers for the Chicago, Milwaukee and St. Paul, and it was found necessary to relieve the rear drivers of excess weight by placing a carrying-wheel behind them. These two cases may be termed accidental, however. The real possibilities of the design were developed first by the Brooks Works in 1901 in engines built for the Rock Island and the Missouri Pacific. Not many engines of this type were built until after 1907, when the capacity of the Atlantic type was severely taxed and the extra pair of drivers was needed. The use of the Pacific type was extended so rapidly that, by 1910, all other types were practically supplanted for heavy passenger service (Fig. 57).

There have been attempts to build engines of the Mallet type (referred to at length later) for passenger traffic, but these have not been very successful, and at present the tendency is toward eight-driver engines where the service requirements are beyond the capacity of the Pacific type. One large road has a large number of Mikados (see next paragraph) hauling its passenger trains over mountain divisions, but here again the double leading-truck has come into use and the "Mountain" type has been developed (Fig. 58). This engine is similar to the Pacific, with

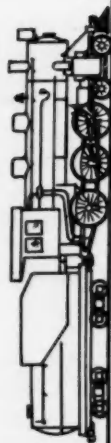


FIG. 56 - TEN-WHEEL, 1912



FIG. 57 - PACIFIC TYPE, 1912.

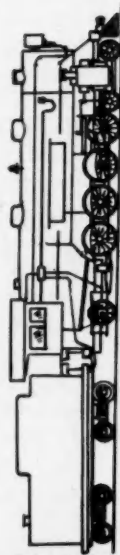


FIG. 58 MOUNTAIN TYPE, 1913

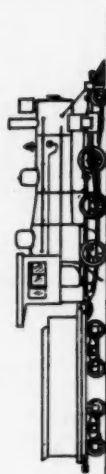


FIG. 59- MOGUL TYPE, 1895

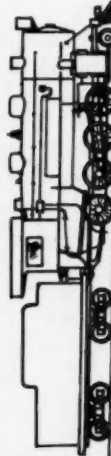


FIG. 60 - CONSOLIDATION TYPE, 1910



FIG. 61, PRAIRIE TYPE, 1906

the addition of another pair of drivers, and this type seems destined to become standard in service where "double-heading" has previously been necessary.

\* \* \* \* \*

In 1890 all freight traffic except the most exacting was handled by Mogul (Fig.59) and Ten-wheel (Fig.55) engines, with the Consolidation hauling the heaviest trains and those in mountainous districts. By 1900 the limit of usefulness of the six-driver engines had been reached in most main-line freight service, and the Consolidation was almost universal. The demand for greater hauling capacity produced the Decapod type in 1902 (Fig. 62)\*—not a new type, but one which had been dormant for several years. In 1903 this was followed by the "Santa Fe" type, built first for the road of the same name, an engine more flexible and safer on curves than the Decapod. It is a type which becomes much more important at a later date (Fig. 63). From ten to twelve drivers is a logical growth, but it required a new departure, as a locomotive with twelve-coupled drivers would be impracticable on curved track. The advance was made by means of dividing the drivers into two sets of six each, with a cylinder for each set of drivers. This type of construction—the Mallet principle—borrowed from Europe, made still further increases in hauling capacity possible by the use of six pairs of driving wheels, then seven, and later eight and ten pairs.\* The capacity of the eight-driver engine was sufficient, however, for all usual train loads, and as a result we have Consolidations of much greater weight (Fig. 60), and the Twelve-wheel and Mikado types (Figs. 64 and 65) which were evolved from it. The former type permitted the increase of boiler capacity by the use of a double engine-truck, but this was of little value, as the increase was

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\*Editor's Note.—Figs. 62-66 will be presented in next issue.

\*See further discussion later.

## South Carolina Canal and Rail Road

By G. E. MAULDIN

The first successful steam railroad operation in America was in South Carolina on a line now a part of Southern Railway System. At the beginning of the nineteenth century Charleston, the commercial center of that section, was enjoying a fair trade with the merchants and the planters of South Carolina and parts of adjoining states. Owing to the natural advantage afforded by the river from Augusta, some of this traffic was lost to Savannah, Ga. Few of the streams within the State were dependable and the movement of merchandise and agricultural products by wagon was slow and expensive. In 1827 the people of Charleston, alive to the importance of providing a more satisfactory means of transportation, determined to build a railroad to the Savannah river at some point near Augusta, Ga., with branches to Columbia and Camden, S. C.

At a meeting of the citizens of Charleston held in the City Hall on December 6, 1827, a petition was adopted asking the legislature to cause a survey of the country between Charleston and Augusta with a view to a railroad. Alexander Black, a representative from Charleston and the moving spirit in the enterprise, already had on his own responsibility introduced a bill to incorporate a railroad. A charter was granted December 19, 1827, authorizing the organization of a corporation under the style of South Carolina Canal and Rail Road Company.

"for the construction of a railroad or a canal, or a railroad and canal, from the city of Charleston on the most practicable routes to each of the towns of Columbia, Camden and Hamburgh."

This Act was not satisfactory to those who wished a railroad, but it served to show the sense of the legislature as regarded so great an object. The charter was amended January 30, 1828, providing among other things

"That the company provided for in the aforesaid Act and hereinafter more especially incorporated and authorized shall and may direct and confine their first efforts and enterprise to the formation and completion of the railroad communication between Charleston and the Savannah River at or near Hamburgh, and other points or places on said river by branch or branches of the said railroad in the manner hereinafter mentioned",

but with power thereafter to construct branches to Columbia and Camden.

A committee appointed by the Chamber of Commerce on February 4 to enquire into the effects likely to result to the

trade and general interest of Charleston by the establishment of a railroad, the probable cost of, and the revenue likely to be derived from, the enterprise, reported favorably on the project.

Books for subscriptions to the stock were opened on March 17 and 3501 shares, sufficient to form a company, were taken at Charleston.

At a meeting of the stockholders held on May 12, 1828, the Company was organized, with William Aiken as President. Major Black was elected a director and with the title of Commissioner had general supervision of the construction. Horatio Allen, who was appointed Chief Engineer in September 1829, located the line at Hamburg. Mr. Allen recommended that the railroad be constructed for locomotive power.

The mode of construction was to drive piles every six feet apart in parallel lines; the heads of the piles were bound together by transverse sleepers, surmounted by longitudinal wooden rails, about nine inches square, of various lengths, on the top of which, on the inner side, the flat bar iron was nailed. The gauge of the track was five feet, which was continued until 1886 when all southern railroads changed to the present standard. Several years after the opening of the line to Hamburg the superstructure was embanked.

The first construction contracts were given out December 28, 1829, and work actually began at Line Street, Charleston, January 9, 1830. Six miles were completed in that year.

On January 14, 1830, the Board of Directors adopted the report of Thomas Bennett, a director, containing the following words:

"The locomotive shall alone be used. The perfection of this power in its applications to railroads is fast maturing, and will certainly reach, within the period of constructing our road, a degree of excellence which will render the application of animal power a gross abuse of the gifts of genius and science."

E. L. Miller, one of the directors, undertook at his private risk to provide a satisfactory locomotive and contract was accepted by the Board on March 1, 1830. This locomotive, to which Mr. Miller gave the name of the "Best Friend of Charleston", the first to be constructed in America for actual service on a railroad, was designed by C. E. Detmold, an assistant engineer of the Company, and was built at the West Point Foundry in New York City. It was forwarded from New York October 12 by the ship "Niagara", of the Charleston Packet Ship Line, arriving in Charleston October 23, and was put together by Julius D.

Petsch and Nicholas W. Darrell, employees of the firm of Dotterer & Eason, machinists, Charleston. The engine was tried on December 14 and 15 and on December 25, 1830, was placed in regular service. The following announcement appeared in the Charleston newspapers December 24:

"The public are respectfully informed that the Rail Road Company has purchased from Mr. E. L. Miller his Locomotive Steam Engine and that it will hereafter be constantly employed in the transportation of Passengers.

The times of leaving the station in Line Street will be 8 o'clock, at 10 A. M. and 1 and at half past 3 o'clock P. M.

Parties may be accommodated at the intermediate hours by agreeing with the Engineer. Great punctuality will be observed in the time of starting.

The Board of Directors have taken all due precautions to ascertain that the engine is well adapted to the purpose of the railroad and gentlemen of distinguished knowledge in machinery have certified that 'the manner in which it is executed—the various combinations and mechanics of the engine is not surpassed in skill and neatness of finish by any high pressure engine of American Manufacture known in this State.'

This engine is of six horse power, its weight of 3 tons and  $\frac{1}{4}$  exclusive of the wood and water for keeping it in continued action. It is said to have moved on some occasions at the rate of 30 miles per hour, but when drawing a train of loaded cars which weighed 3 times as much as itself it moved with great ease from 10 to 15  $\frac{1}{2}$ , being an average of 12 miles per hour.

When drawing 2 cars with 41 passengers it went at an average rate of nearly 16 and where the road was straight at 20-93/100 miles per hour.

The steam in the engine is not worked as high as is usual in the stationary high pressure engines in this State.

By order of the Board

JOHN T. ROBERTSON, Secretary, SCC&RRCo."

Mr. Darrell was from the beginning the regular engineer of the "Best Friend" and later became the first Superintendent of Machinery of the Company.

The second engine, the "West Point", also built at the West Point Foundry, arrived in Charleston by ship in February 1831.

The annual report dated May 7, 1832, stated that "our road is the first in America on which the mail was transported."

The road was opened to Branchville, S. C., 62 miles, November 7, 1832, and to Hamburg, S. C., across the Savannah River from Augusta, Ga., October 1, 1833, and at that time was the longest continuous railroad in the world—136 miles. Hamburg had been established in 1821 by Henry Shultz with a view of rivaling Augusta by intercepting the cotton and other produce that went there every year from the Carolina side of the river.

Elias Horry, the second President of the Company, in an address delivered in Charleston October 2, 1833, on the completion of the road, said in part:

"In South-Carolina, particularly in Charleston, a respectable portion of our citizens wisely determined, that Rail-Roads would be eminently beneficial to the State; that they would revive the diminished Commerce of our City, and tend to bring back the depreciated value of property to its former standard. In fact, it became necessary that some efficient measure, some great enterprise should be resorted to. \* \* \* To improve, therefore, the welfare of Charleston, and forward as much as possible her prosperity and that of the State, our best merchants and most intelligent men decided in favor of the adoption of the Rail-Road System. The plan was, that a Rail-Road be located from Charleston to Hamburg on the Savannah River, and that a branch should be extended from the main line when completed, to Columbia, and afterwards another branch to Camden."

The railroad at once became a power in the establishment and upbuilding of towns along the line and in the control of freight and passenger traffic not only for Charleston itself but through that port to and from New York City and the East, confirming the foresight of the men who conceived, and justifying the faith and courage of those who financed and carried out, the undertaking.

As a part of a scheme to build to the Ohio River the Louisville, Cincinnati and Charleston Rail Road Company was chartered in South Carolina in 1836. The line from Branchville to Columbia, 66 miles, was completed in 1840 and contributed to the increased cash profit as opening a larger field to operate on the commercial interchange of the interior.

The plan to build to the west was abandoned, but from time to time other railroads were built practically along the proposed route. These railroads are now in Southern Railway System.

Louisville, Cincinnati and Charleston Rail Road Company and South Carolina Canal and Rail Road Company were consolidated in 1844 as South Carolina Rail Road Company. The line from Kingsville to Camden, S. C., 37 miles, was opened in 1848. At that time the "System" had a total of 239 miles. The extension from Hamburg across the river to Augusta was made in 1853.

The success of the Charleston venture encouraged the building of roads from Columbia to the up country of South Carolina and to Charlotte, N. C., and from Augusta to points in Georgia. The interchange with these new lines added to the growing traffic of the first railroad of the South.

South Carolina Rail Road Company became South Carolina Railway Company in 1881 and South Carolina and Georgia Railroad Company in 1894.

Since April 1899 the railroad has been a part of Southern Railway System.

Following is a list of the locomotives in use from time 1830 to 1868:

Name	Builder	Received	Cylinders	Remarks	Cost
Best Friend of Charleston	West Point Fdy.	12-1830	6 x16	Reb. 1831 named Phoenix	\$ 4,000.00
West Point	West Point Fdy.	4-1831	6 x16	Exploded Dec. 27-1832. Reb. Apr. 1833	3,250.00
South Carolina		1-1832			5,000.00
Charleston		4-1833			5,750.00
Barnwell		6-1833			5,750.00
Native	Eason & Dotterer	1833			
Edisto		9-1833			5,750.00
Hamburgh	West Point Fdy.	10-1833			
E. L. Miller	M. W. Baldwin	3-1834	10 x16	Reb. 1845 named Edgefield Scrap 1850	6,211.08
Augusta	E. Bury, Liverpool	1834			
Georgia	E. Bury, Liverpool	1834			
Columbia	Fenton & Co.	1834			
Wm. Aiken	R. Stevenson & Co.	1834	10 x16	Reb. 1842. Scrap 1851	6,890.21
E. Horry	R. Stevenson & Co.	1834		Reb. 1842 named Camden	6,650.91
Kentucky	Vulcan Fdy.	1835	10 x16	Scrap 1844	6,013.10
Cincinnati	Vulcan Fdy.	1835	10 x16	Reb. Named Alabama. Scrap 1850	6,013.10
Allen	Vulcan Fdy.	1835	10 x16	Stored 1842 for several yrs.	6,013.10
Sumter	R. Stevenson & Co.	1835	16 x22 1/2	Scrap 1851	6,284.23
Marion	R. Stevenson & Co.	1835	16 x22 1/2	Scrap 1851	6,284.23
Ohio	R. Stevenson & Co.	1835	16 x22 1/2	Scrap 1851	6,284.23
H. Shultz	Rothwell, Newcastle	1835		Scrap 1844	5,359.75
Washington	Eason & Dotterer	1835			5,716.10
Tennessee	Rothwell, Newcastle	1836		Scrap 1843	7,610.90
Lafayette	Eason & Dotterer	1836		New boiler 1843. Scrap 1849	5,721.00
Franklin	Thos. Dotterer	1836			6,525.00
Philadelphia	M. W. Baldwin	1836		Scrap 1843	6,769.39
Wm. Penn.	T. W. Smith & Co.	1837			
Alexandria	T. W. Smith & Co.	1837			
Edisto	M. W. Baldwin	1837		Reb. 1845	6,609.00
Barnwell	M. W. Baldwin	10-1837		Scrap 1850	6,701.38

Name	Builder	Received	Cylinders	Remarks	Cost
Moultrie	Thos. Dotterer	1837			5,525.00
Vulcan	McLeish & Smith	1837			5,750.00
Charleston	McLeish & Smith	1837			5,750.00
Branchville	Eason & Dotterer	1838			5,750.00
Reading	Eason & Dotterer	1838			
Line Street		1838			
Robert Y. Hayne	Bald. Vale & Hufty	1839		Reb. 1843. Scrap 1848	7,083.39
John Ravenel	Bald. Vale & Hufty	5-1839		Scrap 1850	7,114.30
Buena Vista	Bald. Vale & Hufty	5-1839		Scrap 1850	8,000.00
Orangeburg	So. Car. Canal & RR	2-1841		Exploded Apr. 9, 1848	
				1st built by RRCo. Condemned 1851.	
				Sold 1854 for \$1000.	6,000.00
Camel	Bald. & Whitney	9-1843		Scrap 1851	6,810.03
T. Tupper	Bald. & Whitney	10-1843			6,826.28
Georgia	Bald. & Whitney	10-1843			6,722.83
Tennessee	Bald. & Whitney	6-1844		Replaced old "Tennessee"	6,812.83
Louisiana	Bald. & Whitney	9-1844			6,867.23
Arkansas	Bald. & Whitney	11-1844		Sold 1855	6,894.28
Texas	Bald. & Whitney	9-1845	14 x18	In collision 9-12-1851 with F. H. Elmore.	
				Condemned 1864	7,113.28
Antelope	Bald. & Whitney	1-1846	13 1/2 x18	Baldwin's 1st 8 wh. eng.	7,755.53
Comet	Bald. & Whitney	1-1846	13 1/2 x18		7,847.91
Dolphin	Bald. & Whitney	2-1846	13 1/2 x18		7,841.28
Southerner	So. Carolina RR	1-1846			5,750.00
Falcon	M. W. Baldwin	9-1846		Scrap 1851	7,577.03
Nashville	So. Carolina RR	4-1847			6,510.00
Nashville	M. W. Baldwin	5-1847			8,406.28
Atlanta	M. W. Baldwin	6-1847	14 x18	Scrap 1856	8,406.28
Coosa	M. W. Baldwin	7-1847			8,406.28
Waterree	M. W. Baldwin	7-1847		Scrap 1856	8,142.11
Rough and Ready	Ross Winans	7-1847	14 x18	Reb. 1851 for Freight. Condem'd 1855	8,633.23
John C. Calhoun	Norris & Bros.	8-1847		Reb. 1850 for Freight	8,636.72
Cerro Gordo	Norris & Bros.	8-1847			7,922.06
Chattanooga	M. W. Baldwin	9-1847		Scrap 1856	7,391.53
Rio Grande	M. W. Baldwin	4-1847			

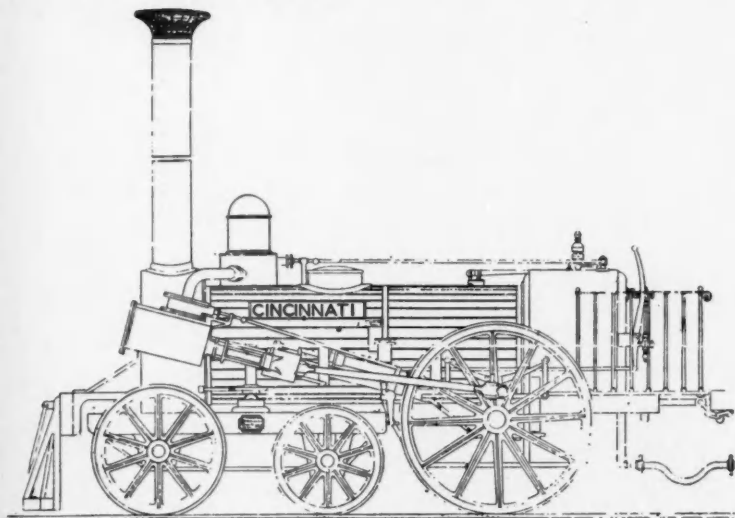
Name	Builder	Received	Cylinders	Remarks	Cost
Memphis	M. W. Baldwin	1-1849		Scrap 1854	7,914.17
Mississippi	Norris & Bros.	6-1849	13 1/2 x22	Reb. to 8 wh.	8,404.73
Charleston	Norris & Bros.	7-1849	13 1/2 x22		8,408.34
Cherokee	Norris & Bros.	10-1849			8,297.03
California	Norris & Bros.	11-1849			8,302.03
Flying Dutchman	Norris & Bros.	10-1849	12 x24	Scrap 1859	7,802.03
Robert Y. Hayne	Norris & Bros.	9-1850	10 1/2 x24	Scrap 1859	7,790.75
F. H. Elmore	Norris & Bros.	9-1850	12 x26	Exploded 1859	7,743.75
Wm. Lowndes	Norris & Bros.	10-1850		Scrap 1856	7,536.37
Langdon Cheeves	M. W. Baldwin	11-1850	13 x20	Scrap 1866	7,880.38
Wm. Cummings	Reg. Ketch. & Grov.	11-1850	13 1/2 x22	Scrap 1859	7,717.34
George McDuffie	M. W. Baldwin	3-1851	12 x26		7,763.00
D. E. Huger	Norris & Bros.	5-1851	12 x26	In collision 11-20-1851 with F. H. Elmore	8,120.00
V. K. Stevenson	Norris & Bros.	7-1851	12 x26		8,120.00
Ariel	Norris & Bros.	9-1851	11 1/2 x24	Reb. 11-1866. Scrap 1872	7,693.00
Sylphide	Norris & Bros.	10-1851	11 1/2 x24	Exploded 11-14-1851. Scrap 1851	7,693.00
James L. Pettigru	Newcastle Mfg. Co.	5-1851	14 1/2 x20	Sold 1861 to D. Riker for \$800.00	7,600.00
James L. Pettigru	Newcastle Mfg. Co.	5-1852	14 1/2 x20	Sold to R. Norris & Son 1854	7,500.00
Fawn	Norris & Bros.	7-1852		Scrap 1859	8,200.00
Horatio Allen	New Jersey Loco. Wks.	7-1852	11 x24		8,200.00
Humming Bird	New Jersey Loco. Wks.	7-1852	11 1/2 x24		8,200.00
James Adger	Norris & Bros.	8-1852	12 x26		8,100.00
John Fraser	Norris & Bros.	9-1852	12 x26		8,100.00
Joseph Johnson	Norris & Bros.	9-1852	12 x26		8,100.00
Velocity	Reg. Ketch. & Grov.	9-1852		Reb. to Pass. service-dr. chg'd. to 60".	8,100.00
Gazelle	Norris & Bros.	9-1852	12 x26	Scrap 1880	
Thomas Bennett	Reg. Ketch. & Grov.	9-1852	12 x26	Sold 1856 to Greenville & Columbia RR	8,300.00
Wm. Aiken	Norris Bros.	10-1852	12 x26	\$8,200.	7,500.00
Edward Carew	Newcastle Mfg. Co.	11-1852	13 1/2 x20	Scrap 1871	8,300.00
Mayor of Augusta	Anderson & Souther	1-1853	14 x24		8,100.00
South Carolina	Anderson & Souther	1-1853	14 x24		6,600.00
					8,023.00
					8,017.00

Name	Builder	Received	Cylinders	Remarks	Cost
Wade Hampton	Norris Bros.	2-1853	12 x26	.....	7,981.00
J. G. M. Ramsey	Norris Bros.	2-1853	12 x26	.....	7,974.00
Brian Boromibe	Norris Bros.	2-1853	12 x26	.....	7,974.00
Tiger	Anderson & Souther	2-1853	14 x24	Scrap 1866 .....	8,017.00
North Carolina	Norris Bros.	2-1853	14 x24	Scrap 1866 .....	7,981.00
Andrew Wallace	M. W. Baldwin	9-1853	14 x18	.....	8,308.00
C. J. Shannon	M. W. Baldwin	9-1853	14 x18	.....	8,308.00
A. E. Mills	M. W. Baldwin	9-1853	14 x18	.....	8,308.00
J. A. Whitesides	M. W. Baldwin	10-1853	14 x18	.....	8,308.00
Senator Butler	R. Norris & Son	12-1853	12 x24	Scrap 1866 .....	8,666.00
Gov. Manning	R. Norris & Son	12-1853	12 x24	Scrap 1870 .....	8,666.00
W. H. Thomas	R. Norris & Son	12-1853	12 x24	Scrap 1879 .....	8,311.00
J. D. Petsch	R. Norris & Son	12-1853	12 x24	Sold to Spartanburg & Union RR 1859 \$8,516. ....	8,511.00
Fawn	R. Norris & Son	8-1854	12 x24	Scrap 1871 .....	8,935.00
Gazelle	R. Norris & Son	8-1854	12 x24	Scrap 1866 .....	8,935.00
Mayor Hutchinson	R. Norris & Son	10-1854	12 x24	Scrap 1871 .....	8,945.00
Mitchell King	R. Norris & Son	10-1854	12 x24	Reb. drivers chgd. to 54". Scrap 1880 ..	8,495.00
Gov. Morehead	M. W. Baldwin	12-1854	13 1/2 x18	Scrap 1874 .....	8,080.00
John Springs	M. W. Baldwin	12-1854	13 1/2 x24	Scrap 1866 .....	9,253.06
Alex. Black	M. W. Baldwin	12-1854	13 1/2 x18	Disappeared 1861 .....	8,090.00
Thos. Rogers	Rog. Ketch. & Grov.	1-1855	14 1/2 x20	Scrap 1884 .....	9,601.00
H. W. Connor	R. Norris & Son	1-1855	14 x24	Sold 1861 to Miss. & Tenn. RR \$9,506 ..	9,506.00
James Gadsden	M. W. Baldwin	7-1855	14 x22	Scrap 1886 .....	9,106.00
Thomas Dotterer	M. W. Baldwin	9-1855	14 x24	Disappeared 1861 .....	9,101.00
G. B. Lythgoe	M. W. Baldwin	10-1855	14 x24	Scrap 1870 .....	9,101.00
C. M. Furman	R. Norris & Son	12-1855	15 x24	Scrap 1886 .....	8,873.00
Wm. C. Dukes	Rog. Ketch. & Grov.	2-1856	14 x24	Scrap 1886 .....	9,036.00
Henry Gourdin	Rog. Ketch. & Grov.	3-1856	14 x24	Scrap 1886 .....	9,036.00
L. J. Patterson	Rog. Ketch. & Grov.	4-1856	14 x24	Scrap 1886 .....	9,167.00
John Bryce	M. W. Baldwin & Co.	4-1856	14 x24	.....	9,011.00
James Rose	M. W. Baldwin & Co.	4-1856	14 x24	Chgd'd to 13 x 24 with 60" dr. Scrap 1886	9,361.00
T. Tupper	R. Norris & Son	5-1856	15 x24	Scrap 1871 .....	9,517.00

Name	Builder	Received	Cylinders	Remarks	Cost
Geo. A. Trenholm	R. Norris & Son	5-1856	15 x24	Scrap 1884	9,517.00
Thomas C. Perrin	M. W. Baldwin & Co.	10-1856	15 x24	Disappeared 1861—possibly went to war	9,514.00
Gov. Adams	M. W. Baldwin & Co.	12-1856	15 x24	New boiler 1889. Sold McDonough & Co.	9,506.00
Sam Tate	M. W. Baldwin & Co.	2-1857	15 x24	1900	9,814.00
Preston S. Brooks	R. Norris & Son	7-1857	13 x22	Scrap 1871	8,807.00
L. M. Kelti	Rog. Ketch. & Grov.	7-1857	13 x22	Scrap 1887	9,057.00
Wm. P. Miles	M. W. Baldwin & Co.	2-1858	15 x24	Scrap 1887	9,525.00
M. W. Baldwin	M. W. Baldwin & Co.	4-1858	16 3/4 x22	Chgd. to "S. Miles" 1861. Scrap 1868	10,540.00
James S. Scott	Rog. Ketch. & Grov.	9-1858	13 x22	Scrap 1886	9,467.00
Thomas Waring	M. W. Baldwin & Co.	3-1859	15 1/2 x22	Scrap 1876	10,017.00
W. C. Gatewood	M. W. Baldwin & Co.	6-1859	15 1/2 x22	Scrap 1876	10,065.00
A. Burnside	M. W. Baldwin & Co.	6-1859	15 1/2 x22	Scrap 1876	10,017.00
E. F. Raworth	M. W. Baldwin & Co.	7-1859	13 x24	Scrap 1886	8,906.00
C. T. Mitchell	M. W. Baldwin & Co.	8-1859	15 1/2 x22	Scrap 1876	10,095.00
J. S. Corry	M. W. Baldwin & Co.	3-1860	15 1/2 x22	Reb. 1880 for passenger service 14x24	9,957.00
W. S. Stockton	M. W. Baldwin & Co.	3-1860	15 1/2 x22	Reb. 1880 for passenger service 14x24	9,957.00
W. Pettit	M. W. Baldwin & Co.	4-1860	15 1/2 x22	Name chgd. to "J. A. Allen." Disap	8,688.00
Spartanburg	Portland Co. #82	4-1860	13 x20	peared 1861 Built for Spartanburg & Union RR 4-1850 and sold to So. Car. RR. Chgd. to Gen. Beauregard. SC 1879	8,516.00
Gen. James Simon	M. W. Baldwin & Co.	8-1860	14 x24	Sold to Greenville & Columbia RR 1873	8,665.00
W. D. Porter	M. W. Baldwin & Co.	8-1860	13 x24	Sold to Greenville & Columbia RR 1873	8,665.00
J. W. Meredith	R. Norris & Son	4-1866	15 x22	From US Gov. 1866. Scrap 1873	8,056.65
A. Simonds	M. W. Baldwin & Co.	7-1866	14 x22	From US Gov. 1866. Scrap 1879	7,163.23
John Caldwell	M. W. Baldwin & Co.	9-1866	14 x24	Sold McDonough 1900	13,861.98
Stonewall	M. W. Baldwin & Co.	10-1866	14 x24		16,743.46
R. E. Lee	Rog. Mach. Wks.	10-1866	14 x24		16,743.46
T. W. Wagner	Rog. Mach. Wks.	11-1866	14 x24		17,366.56
					17,266.00
					17,266.00

### The "Cincinnati," a Pioneer Southern Railway Locomotive.

One of the earliest locomotives operated on lines now making up the Southern Railway, and indeed one of the first operated in the United States, was shown in the above print, the "Cincinnati," one of the three locomotives designed for the South Carolina Railroad Company in October, 1835, by Horatio Allen and built by "Tayleur of England" as the builder was modestly styled on the original print which is now in the archives of Southern Railway Company.



The "Cincinnati" was constructed at the Vulcan foundry, Warrington, its serial number being 20. The only dimensions of the "Cincinnati" given on the print are the following cylinders 10"x16", drivers 64", track gauge 60"—so that it was at least wider than present day Southern Railway locomotives, if diminutive by comparison in other respects.

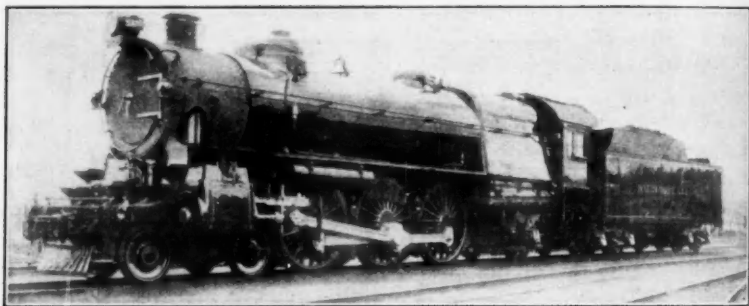
The two counterparts of the "Cincinnati" were named the "Kentucky" and the "Allen", the last supposedly in honor of their designer. The names, "Cincinnati" and "Kentucky", are significant of the purpose of the projectors of the South Carolina Railroad to build a railroad from Charleston to the Ohio river. This plan, of which Robert Y. Hayne was the leading exponent, was carried out many years later by Southern Railway and the

"Carolina Special," a high class modern passenger train between Charleston and Cincinnati, is running every day over the same line on which the "Cincinnati", the "Kentucky", and the "Allen" saw service in 1835.

Courtesy "Southern News Bulletin."

## The "President Cleveland"

It is not often that we illustrate or touch on the subject of modern locomotives as the purpose and interest of this Society is with the historical. However, the "President Cleveland," recently rebuilt by the Baltimore & Ohio Railroad, because of its connection with the "Fair of the Iron Horse," presents an interesting picture to the student of locomotive development. Those of us who attended the "Fair of the Iron Horse" will remember the simple and smooth stream lines of the British locomotive "King George V." The smooth stream lines of the "President Cleveland" gives this locomotive a unique place



**The "President Cleveland," Just Out of the Shops.**  
Note the smooth stream-lines, characteristic of the English locomotive, "King George V."

among our American locomotives and in the opinion of the writer, is the handsomest locomotive in America. Of the novel devices on this locomotive we are not interested until they have proven their efficiency but it is an interesting tendency to see the handsome lines of the locomotive not destroyed by a mass of pipes and appliances, which doubtless have their utility, but which certainly do destroy harmony. If the "King George V" at the "Fair of the Iron Horse" was the cause of the rebuilding of the "President Cleveland," it will be interesting to note future developments in our locomotive architecture.

## Canadian Locomotive Practice in Early Days

Adapted from the Ms. of "Canadian Railway Development From the Earliest Days"

By NORMAN THOMPSON, Assoc. Mem. Am. Soc. M. E., and  
MAJOR J. H. EDGAR, B. Sc., A. M. E. I. C.

The Title "Great Western Railway" and the inauguration of service date from 1853, the first engines being supplied from England, and it is interesting to note the views of the operating officers in those days, regarding various points of practice, as expressed in early reports furnished to the Directors and Shareholders. The Locomotive Superintendent had something to say with reference to the value of a leading truck, and in 1858 he writes: "I have concluded that a truck is an indispensable article to a quick-running passenger engine, to prevent pounding and rapid destruction of the track." Next year he remarks further: "The ease of motion and safety when running at high speeds is ensured by the use of trucks is all that is required to make these fine engines equal, if not superior, to any others on this Continent." The reference here is to locomotives by English builders.

Another important matter concerning which this Official was evidently much exercised related to the question of fuel. "You are aware that experiments are being tried with coal as fuel, but as there are so many preliminary difficulties to be overcome, and experiments are so few and recent, I cannot yet pronounce any decided opinion, and shall only state that the prospects are favourable." A year later, in 1859, coal had apparently established its worth beyond question, as evidenced by the following extract: "Very satisfactory results have been obtained from the working of the coal-burning engines; coal should be used exclusively upon those districts where wood is scarce and expensive. As the average run of our train engines is now upwards of fifty miles with each cord of wood, any transfer of fuel from the place of reception to other stations is rendered unnecessary." Four years earlier, the mileage per cord had only reached thirty-six, so that a notable increase in efficiency had taken place during the interval.

Original estimates calculated that twenty engines would be needed on the basis of one to every twelve miles; they appear to have always been referred to by name alone, the titles being in many instances happily chosen, as exemplified in 'Gazelle',

'Reindeer', 'Firebrand', 'Ajax', 'Pluto' and 'Venus'. In other cases the somewhat unimaginative plan of commemorating places served by the Railways was put into effect. An important deviation, however, occurred when the Company decided to build an engine in their own Shops, and employed 'George Stephenson' as the name. According to a print in the Chateau de Ramezay at Montreal, this was a six-coupled machine, with a straight chimney and a cab, being also equipped with a six-wheeled tender. In the picture the general tint is blue-green, the engine-wheels being pink. The number '67' is shown and the date given is 1860. In February of the previous year the Locomotive Superintendent thus refers to this engine: "Considerable progress has been made with a new and powerful freight engine, which is being constructed in our own Shops;" and again: "The first new freight engine built in our Shops, George Stephenson, set to work January 1860, has worked well."

Coming down to 1864, another print illustrates the 'Diamdem', of the four-coupled type, with a four-wheeled bogie in front, and a cab. The cylinders were inclined, and a handsome brass handrail ran along the boiler near the top. A light pink tint was used for this drawing and on the cab side appears 'G. W. R. 42', and on the tenders, the letters "G. W. R."

A design of engine could have been seen about 1880, furnished with a novel device according to which the bell was operated from one of the leading truck wheels, which worked a trigger connected with the bell. The latter occupied an unusual position on the pilot buffer beam, and in this manner, every revolution of the wheel produced sound from it. After absorption of the Great Western by the Grand Trunk, a locomotive of this description, although altered in appearance, was employed to run the "Globe" fast train carrying newspapers from Toronto to London.

The Hamilton Shops are described at length in a most interesting and quaint manner by an unknown writer in the Hamilton Directory for 1868-9, this account being worthy of a nobler setting. Although much too detailed to permit of entire reproduction a few extracts will be illuminating.

The Erecting Shop is described as a hospital for sick giants. "Your iron horse, though fleet of foot and strong of limb, is after all, finely and even delicately organized, and subject to almost as many ailments as the human frame. Not to speak of the many accidents to which he is liable, he is the victim of cer-

tain diseases which no skill in construction and no care in management has so far been able to prevent; the water which he drinks, for instance, will leave a sedimentary deposit which, in the course of time, if left alone, will derange his whole internal economy; then again his rapid motion and the consequent friction of his rotating and sliding parts gradually wears undulations in surfaces which must be perfectly true in order to discharge their functions with certainty and efficiency; all things considered, therefore, we need not wonder to find his doctor's bill somewhat heavy, but he has the advantage over us of always getting cured." The use of the relative pronoun 'HE' is notable in contradistinction to the more usual feminine as applied to locomotives. "Here we see the locomotive in every stage of development, from the primitive boiler, resting upon its timber foundation in helpless imbecility, to the completed engine, under a full 'head of steam', emitting a fizzling, gurgling sound, and awaiting but the magic touch of the engineman's fingers to be off on its iron roadway with a speed that outrivals the winged eagle, and a power that laughs at the ponderous elephant."

Turning to the Grand Trunk Railway, the first engines were also built in England, those used on construction trains and for ballasting having rigid connections; but passenger and freight ones having trucks. The weight averaged about 56,000 pounds, both inside and outside cylinders being fitted, with four-coupled driving wheels. During 1854-58 the Portland Locomotive Works were called upon to contribute and a picture taken at a later date shows the initials 'G. T. R.' and the number on the side of the tender, enclosed in an ornamental border and the initials and number were also placed on the cab sides; three domes decorated the boiler-barrel and a roomy cab afforded protection from inclement weather.

Another type constructed at Birkenhead (England) about 1851, possessed a single pair of seven-foot driving wheels, and leading and trailing trucks, proving highly speedy and efficient in handling the light trains of the period. Their low tractive effort however, was insufficient to render them good snow-fighters, and they became converted into four-wheeled shunters, two being named respectively, "Boxer" and "Growler." Engine-drivers and firemen took particular pride in cleaning their machines, which were ornamented with brass bands round the boiler and sported a great deal of brasswork in mountings, handrails, bells etc., and these always showed the result of being polished

to a high degree. A son of Trevithick (whose name is associated with early locomotive experiments in England) became the first locomotive superintendent on the Grand Trunk. In 1856, reports stated that stations averaged one to every six miles; men, two to every three miles, and locomotives, one to every four miles. Comparing this with the Great Western, it is interesting to note that the engine density on the Grand Trunk was just three times that proposed for its rival.

Through the sixties and seventies of last century, nearly all locomotives in Canada were adapted for burning wood, being provided with enormous smokestacks, in many instances of greater diameter at the top than the boilers to which they formed an attachment; having been so designed to catch and retain the large quantity of sparks given off. At one time peat was tried on the Grand Trunk as fuel, but without success, and the rural population found a thriving industry ready to their hand in supplying the ramparts of cordwood that were stacked up on banks overlooking the line, these being removed periodically to the depots by the wood trains. Sometimes, however, a needy engine would halt and 'bunker up' from one of these friendly wood-piles.

The cordwood furnished at stations in those days required to be re-cut before use, this being accomplished by means of a circular saw driven by a horse walking on an inclined tread machine through a belt to the saw. Later on, a steam portable apparatus was employed, and when finished at one station, it proceeded on the main track by its own power to the next. The cut wood was piled in cord racks for the engines, to be accounted for by the Agent; and if possible, the amount had to tally with the original quantity received. This often proved a difficult feat, owing to many freight trains passing in the night or early morning when no one was in charge at the stations, the temptation to raid the wood-pile under such circumstances being greater than many of the train crews could successfully resist. Sam Angle's wood train with its complement of a hundred coloured men and Indians was the village sensation when the sawing outfit appeared, to slash through hundreds of cords piled along the right of way. Trains leaving London with generous supplies required replenishing along the route to Windsor at such points as Bothwell, Thamesville and Chatham, so that anything in the nature of long-distance non-stop runs could not be considered. Mem-

bers of the crews were adepts at handling the fuel so quickly that little delay ensued from this cause.

As time went on, the old wood-burning engines were gradually equipped for absorbing coal, with which fuel their capacious fireboxes did not prove altogether satisfactory. The firemen were unwilling to countenance the change, and when a driver and fireman, both of whom were experienced in wood-burning, took charge of a coal-consumer, difficulty was also found in raising steam. The matter of providing an adequate water supply constituted one of the great troubles encountered in early days, hand-pumping from large wells situated immediately behind the tank-houses being resorted to, although at one station the plan was tried of heating the water through by pipes from a boiler, leading into a tank, this method being abandoned following an explosion. No external indicators being furnished, frequent examinations of water levels in the tanks were necessary.

Many amusing incidents are related concerning these old cordwood days. Occasionally a train would break down miles from anywhere, and by the time that repairs could be effected, the engine would have consumed its bunker-load of fuel. The process of 'wooding-up', as it was called, involved assistance from the passengers, and if no supplies chanced to be conveniently available, axes were served out, and one and all set to work felling and splitting trees. Should there arise any demur, the driver and fireman composed themselves for a nap until such time as the travellers came to see the matter in a different light. While awaiting repairs, passengers would often scour adjacent woods seeking amusement, or occupy the time paying visits to settlers living nearby.

Note.—Acknowledgement is made to Mr. H. B. Whitton, of Hamilton, Ontario, for kind permission to see the Reports of the G. W. R.; the other sources of information being fully set out in the complete Ms. of which this forms a series of short extracts.

# **Notes on Northern Pacific Railroad Employees Time Table No. 1.**

## **Eastern Divisions and Branches.**

**6.00 A. M. Sept. 2nd. 1883.**

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(In Library of Minnesota Historical Society, St. Paul.)

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Some curious expressions are used in the notes, and terms now obsolete. The effective time of 6.00 A. M. is a departure from the present day practice of adopting midnight for the change.

The word "Pass" is used in the sense of overtaking, while "Meet" signifies what one might perhaps consider "Passing."

Possibly the term "Wild Trains" is the most curious found in this time table, and the following are representative quotations from the notes:—

"All wild or irregular trains and all delayed second and third class trains on main line will not exceed six miles per hour between Wadena Depot and Wadena Junction."

"Passengers will not be carried on wild or irregular trains."

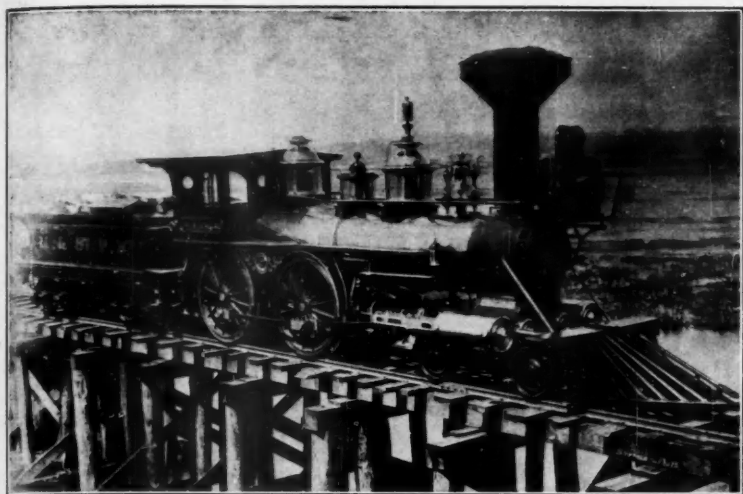
"All wild trains must be held under full control accordingly."

"Trains will reduce speed in passing all bluffs."

Maximum speed for freight trains 20 M. P. H.

Many changes are made in the time standard geographically; fifteen minutes differences being observed.

NORMAN THOMPSON.



The accompanying photograph of the "D. A. Olin" of the Milwaukee & St. Paul R. R. was received from one of our members residing in the former city. The records of the road show this engine was built in 1854, rebuilt at the Milwaukee Shops in 1868. The engine is a wood burner and the cylinders, steam chest, domes, sand box and hand rail were all finished with German silver. The cab was mahogany. The interesting feature about this engine is that it is equipped with piston valves. Do any of our readers know of a previous application of these valves?

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### **In Memory of**

**C. J. McDONOUGH**

AGENT, BOSTON & MAINE RAILROAD

SUNCOOK, NEW HAMPSHIRE

*Who Died on*

TUESDAY, APRIL 17TH, 1928.

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CHAPTER 2

THEORY OF THE EARTH

AND ITS HISTORY

BY J. H. VAN DIJK

AMSTERDAM, 1900

—12—

